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THE STAFF OF LIFE.

Bread is the staff of life, and while man does not live by bread alone, so far as civilised peoples are concerned, it is the first contributing factor towards contentment, just as hunger is the first aching sense calling for appeasement in the animal kingdom. Clothing, wealth, luxury, avail little if the pangs of unsatisfied need for food remain. And of all food that ministers to our appetities what more satisfying, nutritious, and consistently palatable than the baker's loaf.

But not the baker is the most useful person in our social system. We must begin with fundamentals, and he who would bake bread must first have flour, and flour is entirely dependent on the efforts of the wheat farmer. To him, then, we may ascribe the honour of being the first essential unit in our civilisation.

Away back in 1787, when the Australian nation was in its nascency, Captain Phillip at Botany Bay had instructions to proceed with the cultivation of the soil "under such regulations as may be necessary and best calculated for securing supplies of grain and provisions." A year later it was proposed to sow eight acres with wheat and barley. But the Captain was not optimistic, and owing to the "depredations of mice and ants he was doubtful as to the success of the crops." What happened to the sowing is not recorded, but let us hope the doleful prognostication was never realised, for some 13 months later at Rosehill, on the Parramatta River, the harvest for the year was 200 bushels of wheat, 60 bushels of barley, and a small quantity of oats and Indian corn.

In the year 1791, according to the Commonwealth "Year Book," there were 213 acres under crop, and this would appear to have formed the beginnings of agriculture in Australia. Six years later the cropped area had

increased to 3,361 acres of wheat and 1,527 of maize, with small acreages of barley, potatoes and vines; nine years afterwards this area had been doubled, and in 1850 there were 491,000 acres of cultivation in Australia and Tasmania. At this time the population of the four colonies (for Victoria and Queensland had not then been established) numbered less than half a million people, so that there was but little more than an acre per head in tilth. During the ten years following, agriculture dragged somewhat, but from 1860 onwards there was a steady increase of production, and at the close of the 1924-25 season, with a population of roughly 5½ millions, there were 17,278,191 acres of cultivated land in the Commonwealth.

The maximum period of cultivation occurred during the speeding up campaign following the outbreak of the Great War, when Australia put in a crop of 18,528,234 acres. We had now far outpaced the instructions urged upon Captain Phillip to cultivate "under such regulations as may be necessary and best calculated to secure supplies of grain and provisions," and had enough and to spare for less fortunate allies embroiled in the undignified "kultur" media of solving problems.

But it is with wheat, the foundation of our staple national food, that we are principally concerned, and the demand for this grain has never yet been overtaken. Western Australia, it has been proved, possesses large areas of fertile land suitable for the cultivation of this product; but the proof has been a matter of time, experiment and education. Areas now producing wheat in appreciable quantities were not in the beginning regarded as potential wealth producers. If it be accepted that a public benefactor is that man who can make two blades of grass grow where once but one appeared, then much praise is due to those who have guided and controlled the development of our wheat lands, and have evolved those regulations for cultivation that were wished upon Captain Phillip in the early days of our nation.

To Western Australia may be given the credit of contributing no small portion of knowledge to the wheat growers of this country. The principle upon which our agricultural experts have proceeded has been that if this soil and climate will not grow standard wheat economically, let us find a wheat that will grow economically, let us find the best methods of cultivating economically; and as we cannot change the soil and climate, let us force upon both a grain that will respond to them. And they have undoubtedly succeeded. One of the great successes is the "Nabawa" variety of wheat, evolved under the control of the present Director of Agriculture (Mr. Geo. L. Sutton) and his staff, and produced at the Chapman Experiment Farm after years of punctilious selection and experiment. It is significant that in 1925-26 41 per cent. of the wheat sown throughout the State was the "Nabawa" variety. In the following year it increased to 46 per cent., and its popularity is ever increasing, and is enhanced by the fact that "Nabawa" is a prolific yielder, and has valuable disease-resisting qualities. What is still more to the point is the gratifying fact that while our experts have been

evolving a grain that will conform to the climate of our sub-arid areas, they have not been discovering a wheat of poor quality. On the contrary they have given us a superior product of a class that is in wide demand in the markets of the world as an admixture for the up-grading of grain from other countries.

That our acres cannot compare with some of the richer soils in the world for quantity production is not a serious defect, for with large holdings and modern methods of farming, the results achieved by individual growers can be brought up to the prosperity level of older lands. We dare not hope to produce an average of 30 and 40 bushels to the acre, as is done in Denmark, Great Britain, and some of the northern countries, but we are advancing our yield per acre on settled land. True this is not so apparent as might be, but the factors holding down our average yield per acre cropped are not discouraging, and arise mainly from the circumstance that each year sees large areas of new land brought into cultivation which have not—owing to the urgent need of the embryo farmer for an early return—that care and cultivation exercised upon the first crop that, if he be a wise man, the farmer will bestow on future sowings. It has usually been "scratched in." With the continuous opening up of fresh areas these first crops have a strong pull down on our average yield per acre; but in the older-settled localities there is a satisfactory increase, as an examination of the crop competitions' results set out on other pages of this issue will demonstrate, as well as will the excellent map supplied herewith. Necessarily the yearly results cannot be kept at a consistent average, as each season must stand by itself according to the rainfall and conditions governing the growing period. Time has proved, however, that Western Australia's wheat-growing zones are blessed with a fairly regular rainfall, which, though frequently less in volume, seems more immune from those periodical droughts common to other parts of the Commonwealth.

It will be noted from the results of the crop competitions that while the average amongst competitors for the past three years works out at 18 bushels to the acre, the actual individual highest average production was 24 bushels to the acre. Consider that competitors are scattered throughout the wheat belt, are separated by great distances, and that the figures cover three years' tests, and it may be taken as an indication of a rising average wheat yield throughout the State.

The wheat yield of Western Australia has increased from 12¾ million bushels in 1920-21 to 30 million bushels in the 1926-27 season, truly a gratifying progress for the period. The popularity of our wheat land, and its spreading fame, is evidenced by the numerous applications for holdings which come from persons in other States, in many cases the sons of farmers there, who, seeing little room for expansion in their home State must perforce seek farms elsewhere. That they choose Western Australia for their future home is scarcely likely to be the result of mere hazard. That our wheat lands have

been raised to that degree of popularity is neither the result of chance nor good fortune, but of patient, persevering experiment, the scientific study of causes and effects, and the recording of results for future guidance. In this respect the experiment farms have done a wonderful service to the State, as well as the Australian farmer, by their fallowing experiments, grain variety trials, with varied rates of seeding and applying superphosphates, proving methods of cultivation, and by experiment and research opening up sources of future grain supplies long unknown and unsuspected.

Those who have entered wholeheartedly into the crop competitions may be congratulated not only on their foresight in following up departmental lines devised to encourage better farming, but also on their achievements. The winner of these competitions, Mr. J. D. Hammond, has produced a heartening result that must encourage others to seek after similar progression.

It has recently been estimated that within three centuries population will have reached the maximum of the earth's capacity to support, but granted sustained co-operation and effort on the part of the farmers, the Department of Agriculture, and those who carry the grave responsibility of framing our laws and providing the means to the end, it should be many centuries, if ever, before Western Australia's population overtakes its capacity to produce the basic supply of our staff of life.

SMUT ON BROOM MILLET AND OTHER SORGHUMS.

W. M. CARNE,
Botanist and Plant Pathologist.

Consequent on the total prohibition of the importation of millet for broom making into Australia, this crop is likely to become of importance in Western Australia where conditions are favourable. As the bulk of the seed is likely for some years at least to be obtained from abroad, or from the other Australian States, there is a likelihood of the introduction of diseases with the seed. Smut (*Sphacelotheca sorghi*) has already been reported in a broom millet crop this year in the Great Southern district, and in Kaffir corn last year in the South-West. Growers of broom millet and other sorghums are therefore advised to treat the seed as a precautionary measure. One ounce of copper carbonate dust per bushel well dusted over the seed will be found effective against any ordinary infection. As a precaution against the objectionable effects which result from inhaling the dust, the grain should be mixed with the copper carbonate by agitating the two together in a closed vessel. Where any large quantity is to be treated, one of the machines used for wheat dusting should be used. These can be purchased or made on the farm. A leaflet giving the construction of a small effective seed duster will be supplied on application to this Department.

"THE SIRE OF THE FARMER'S FLOCK."

H. McCALLUM,
Sheep and Wool Inspector.

The secret of building up a flock is to establish same upon a good foundation, and work with some definite purpose in view. Unless the flock owner knows what to make his objective, it is better for him to seek advice from some experienced person as to the best lines to work on to effect a permanent improvement.

Too frequently during the past few years the sheep owner has attempted to improve the flock by the indiscriminate purchase of a few rams from some other flock, regardless of their suitability. It must be decided in what particular direction improvement is necessary, and then rams selected that possess marked evidence in themselves of the qualities to be strengthened in the progeny. Many people in selecting their flock sires rely too much upon the outward appearance only, and in so doing they frequently err, as the wool is often of a deceiving quality, and the animals on close inspection prove to have many defects which were not discernible by simply glancing at them. The ram is too important a factor, and has too great an influence on the successful breeding of the sheep, to be used without first being subjected to a rigid and thorough examination. He is the big half of the flock, and careless selection must result in a depreciation in the quality of the progeny.

The secret of successful breeding of sheep is a gradual fixing of characteristics that improve utility, and for this purpose high-class rams are introduced into the flock.

Many failures in attempts to breed up a flock are directly traceable to the owner having no other purpose in mind than a desire to procure a sire as cheaply as possible from any source and of any type. No man can attain success who purchases different types of sheep from various breeders, and thus introduce different strains. The farmer who has sheep, either as a speciality or as an adjunct to his farming operations, must first decide upon the line of breeding he desires to pursue, and then keep true to it. No matter what the ultimate object may be—the production of wool, carcase mutton, or early lambs—success depends much on the attention to detail.

During the next few months sheep farmers will be making their annual purchases of rams, and they must remember that the first essential in building up a flock is constitution.

The outstanding features of a good ram are masculinity; bold appearance; thick, well-shaped horns, set not too close to the head; a large frame with a straight back; well-sprung ribs; plenty of width across the shoulders; a deep girth, this giving the heart and lungs plenty of room; a deep, wide chest; clean, open face, free from wool (woolly-faced rams are the cause of much work and trouble through transmitting the defect to their progeny, and should never be purchased); the big-boned animal is preferable to the thin-boned one; cow-hocked or knock-kneed rams are usually bad walkers.

Many sheep owners neglect to pay attention to the rams after service. The average death rate in rams is generally far greater than it should be

and the percentage of efficient rams at the mating season could be greatly increased by regular and careful inspection of the sires. When they are removed from the ewes they should be examined individually to see that no damage or injury has occurred while at work. Last season I inspected sixteen rams prior to mating, and found that they were not in a condition to mate with the ewes. Every one of them was fly-blown around the base of the horns, and in a very bad way—maggots in some cases were an inch long. This was evidence of sheer neglect. Rams will fight at all seasons of the year, and the broken places are very apt to get fly-blown if not dressed in time. If these rams are not attended to the result will probably be death, and very small percentage of lambs. In the off season the rams should be kept on good pasture to keep them in good condition for their work. More care of the sires, regarding feeding and inspection will result in an increased lambing of much better quality.

On the 16th September at Moora and the 27th and 28th September at Katanning the Annual Stud Sales are held, and the sheep farmer can purchase his requirements. These sales have done much to place before the farmers of this State the high value of the sheep bred in Western Australia. Purchasing locally has an added value, the farmer can inspect and select the ram most suited to his individual flock. This money spent within the State enables the stud owners to build up their studs, and there is no need whatever for the wheat farmer, who pastures a flock of sheep, to procure rams or ewes from the Eastern States to improve his stock. Good high-grade sheep can be purchased at local stud farms situated from Geraldton in the North, to Gnowangerup in the South, and it is sincerely hoped that the sheep farmers generally will realise the great turn these stud owners have done them by so materially improving their flocks as to make first-class sheep available within our State.

"THE JOURNAL OF AGRICULTURE"

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MORE ABOUT THE GENESIS OF THE RABBIT.

C. J. CRAIG,
Chief Inspector of Rabbits.

The records of early Melbourne show that the harmony of the little settlement on the Yarra, destined to become the metropolis of Victoria, was, in the year 1836, disturbed by a dispute which arose between Henry Batman—brother of John Batman—and John Pascoe Fawkner, in connection with the destruction of rabbits, and other matters. At that time there existed no officially constituted tribunal to deal with disputes between the inhabitants, and therefore arbitrators approved by the disputants themselves were selected to hear the evidence and deliver judgment. The arbitrators were Dr. Thomson (the first medico), John Aitken (the first stock breeder), and James Simpson (the first magistrate), who, after examining the evidence furnished on 2nd May, 1836, delivered the following award, which was the first legal decision given in the colony:—"We award in the dispute between Mr. Henry Batman and John Pascoe Fawkner, on the first claim, thirty shillings; on the second claim, nothing, although a strong presumption is in our minds that some hasty expressions of Mr. Batman may have led Bullet to destroy the rabbits. On the third claim, damages five shillings, and a fine of twenty shillings in consideration of its being an act of unauthorised aggression; and, on the fourth claim, nothing, as it does not appear that Mr. Batman set the dogs on the calf, etc., etc.

From the evidence adduced, although the above indicates the contrary, it would appear that Fawkner was the complainant and Batman was the defendant. "Bullet," who actually destroyed the rabbits, was, it is believed, an aborigine from New South Wales, brought over by John Batman, *via* Van Dieman's Land, to assist him in his land transactions with the Port Philip aborigines. There is nothing in the award to indicate whether the rabbits were wild grey rabbits or of the white specie, but there is reason to believe that they were the latter variety.

It is well known that some of the early English colonists, finding that the continent possessed very little indigenous game, and feeling that a few rabbits released upon their estates would provide an additional charm and interest to the landscape, as well as an exciting target for the gun, attempted to introduce them in the fifties and sixties, and, it has been stated, by earlier colonists also in the forties. But it would appear that their efforts were for a long time unsuccessful, and that during the long voyages out in the old sailing ships the rabbits either succumbed to the intense heat while passing through the tropics, or when they arrived here they perished through climatic changes, or the attacks of the native cats, which were then numerous.

In subsequent years it was proved that one landholder who imported a dozen rabbits found that their depredations cost him something like £1,000 per head, and many others had also great cause to lament their folly. They overlooked the fact that in a thickly-populated country rabbits cannot increase to the same extent as they do in a country where the population is sparse, and that the same rabbits which, on account of the large population, were doing no appreciable harm in England or the adjoining continental countries, must become a serious plague in a sparsely-populated country such as Australia, possessing so much natural cover to protect them.

At first they increased and spread very slowly, for the eagle and the hawk accounted for a few young ones, and the native cats also accounted for a great many of the young rabbits, to which they were particularly partial. At length the rabbits secured a firm footing—increased and spread more rapidly. There is no doubt that, as the rabbits increased in number, the cats diminished, until in the early eighties they were rarely to be seen. It has been said that in some localities they were almost exterminated by a disease which attacked them, but as no specie of animal has ever been known to become, through disease alone, practically extinct within such an extensive tract of country, it is likely that some other cause was responsible for their almost entire disappearance.

Gradually extending from their several starting points the rabbits soon overran the whole of the fertile western district, the climatic, soil, and surface conditions of which were ideally suitable for their increase. The stony rises and extensive patches of bracken fern constituted a veritable stronghold from which it would have been impossible to eject them, even were the country closely settled and the inhabitants organised into a fighting force; but, with the country sparsely populated, no legislation in existence providing for suppressive measures, and their natural enemies an inconsiderable factor, there was no chance whatever of arresting their progress, let alone exterminating them. The rabbits easily burrowed into the soft, friable, volcanic soil, and the loamy rises in particular became in many parts the chosen sites for large warrens and detached burrows, round about which there was nearly always plenty of sweet green grass. These warrens, with their network of subterraneous passages, sheltered hundreds of rabbits. In course of time the more venturesome units of the settlement travelled out into the adjoining country and founded fresh settlements. Thus they spread from cover to cover right throughout the central and south-western sections of the State. The indifference with which the rabbits were hitherto regarded was displaced with a feeling of concern, as the authorities saw this rich and fertile section of the State overrun, and the landowners threatened with serious loss. So in 1880 the first Vermin Suppression Act was passed. It provided for simultaneous and other attacks, and the imposition of a penalty upon landholders who neglected to comply with the Act.

Hoping to arrest their progress and to thus protect the north-western country, vermin-proof fences were constructed ahead of them, one fence extending from Swan Hill to Lake Albacutya, and thence to the South Australian border. Boundary riders were employed to supervise and repair the fence where necessary. In addition to this precaution the Rabbit Suppression Act, 1880, provided for the imposition of a maximum penalty of £20 upon any person who should wilfully set loose any rabbits in any part of Victoria, but, in spite of netting fences and the provision of this penalty, rabbits broke through and were conveyed into the country beyond, and the north-western section of the State soon became badly infested.

The South Australian and Victorian Governments in 1887 erected conjointly a rabbit and wild dog-proof fence between the two States. The former Government erected the northern half, from Serviceton northward to the Murray River, and the Victorian Government the southern half, from Serviceton southward to the sea. The length of this fence was about 290 miles, and the cost of its erection and maintenance by boundary riders was very considerable. Gates, of course, had to be provided at certain distances, and someone placed in charge to see that they were kept closed.

The landholders in each State felt that it would be useless to attempt to destroy the rabbits on their runs whilst reinforcements could constantly pour in from the adjoining border country. With the fence erected it was felt that the Victorian station owners would have to destroy their own vermin only and the South Australian station owners were prompted by the same feeling. It was also thought that with the fence erected 3,000,000 acres of unoccupied mallee country on the Victorian side would be readily taken up, and the rabbits thereon easily destroyed. The erection of the border fence was only part of a scheme for isolating and intersecting the mallee block country. By using the border fence as a base and erecting numerous other connecting fences, it was believed that the mallee country would eventually be enclosed by a network of fences which would be an effective check to the vermin, and would enable the lessees to successfully grapple with the pest enclosed within the fences. This was all very easy to project, but most difficult to accomplish. The border fence was completed, and one at least of the projected cross-country fences, but the fences did not accomplish all they were expected to do, or anything approaching it. Landowners could not be induced to display the same interest in the Government fence as they did in their own fences, in which they felt a personal interest and responsibility. This has been the experience in every colony. Fences erected at the expense of the Government were common property, and although collectively the landholders were expected to give them the necessary attention, they did not do so.

Penalties were provided for leaving the gates open, and yet they were left open time after time. In fact, it is on record that some of the supervisors had to employ great cunning and strategy to apprehend certain individuals, who deliberately, in defiance of the law, did their best to maliciously defeat the vigilance of the Government officers. But apart from the carelessness or perversity of the landholders and others, the fence was not for long an effective barrier. Leaves from the vegetation in the vicinity were heaped up against it by the winds, and the drifting sands from the wind-swept sandy country adjoining piled up and up against the fence until in parts it became completely covered. Small sand heaps became sand hills, and in several places fresh fences had to be erected on top of the old ones. The netting soon corroded in the salt-laden sand and became useless. When it was realised how difficult it was to maintain in an effective condition lengthly lines of Government netting, especially in this country, the whole scheme collapsed. Altogether about £26,000 were spent in erecting the border fence, irrespective of the cost entailed in supervising and maintaining it.

The greater part of the western part of the State, from the Murray to the sea, and that part of South Australia from the Murray to the Victorian border, were now overrun. It was anticipated that the Murray River would prevent them from infesting New South Wales and the remainder of South Australia, but this anticipation was not realised for they were very soon found beyond the river and fast penetrating into the interior of the adjoining States.

Then the magnitude of the evil was thoroughly realised in all the States, and urgent measures were taken by the various Government and the affected landholders to check and stamp them out if possible, but all their efforts were of no avail.

BITTER PIT IN APPLES.

ITS OCCURRENCE IN STORE IN RELATION TO DATES OF PICKLING.

GEO. W. WICKENS, Superintendent of Horticulture.
W. M. CARNE, Botanist and Plant Pathologist.

In a recent review of the problem of Bitter Pit in apples, A. J. M. Smith came to certain conclusions of considerable importance to growers, particularly in regard to export fruit. The more important are as follows:—

1. That in certain varieties Bitter Pit characteristically makes its appearance while the fruit is on the trees, but in others it seems to be inhibited while the fruit is on the tree, although it may develop rapidly after picking.

2. In the latter case it has been found to develop in storage to a much greater extent in fruit which has been gathered in a relatively immature condition than in fruit allowed to ripen on the tree.

3. A combination of later picking with more rapid refrigeration may be found to give the best results in checking the development of Bitter Pit in export fruit.

The gist of his article may be summed up as follows:—Though not definitely proven the evidence indicates that Bitter Pit may originate in apples after being picked. That the occurrence of Pit in picked apples depends upon their maturity at the date of picking being greater the more immature the fruit. Finally he concludes that cold storage reduces the rate of Pit development.

These conclusions were so important, and in the case of the relation of immaturity to Pit, so opposed the ideas previously held by us, that it was considered advisable to test them. Accordingly arrangements were made for tests to be conducted at Bridgetown by Orchard Inspector Flintoff. Our thanks are due to Mr. Smith, Engineer-in-Charge of the Bridgetown Cold Stores belonging to the Westralian Farmers, Limited, for assistance readily given. The variety Cleopatra was chosen as being very susceptible, and also an important commercial variety. The fruit was obtained from Mr. C. Ozanne's orchard, and was all picked from the same trees.

The tests and results obtained are as given hereunder:—

TEST 1.—Terminal fruit only. Picked, 23-2-27.

(*a*.) 1 case placed in cold store the same day.

Examined.	Total fruit.	% Pitted.	Increase in Cold Store.
23-2-27 ...	148 ...	5·4 ...	
11-3-27 ...	... ...	8·8 ...	
11-4-27 ...	... ...	27·0 ...	
14-6-27 ...	... ...	27·0 ...	21·6%

(*b.*) 1 case placed in packing shed.

Examined.	Total fruit.	% Pitted.	Increase in ordinary store.
23–2–27 ...	140 ...	7·9 ...	
11–3–27 ...	... ...	40·7 ...	
11–4–27 ...	... ...	42·8 ...	
11–5–27 ...	... ...	46·4 ...	
14–6–27 ...	... ...	48·6 ...	40·7%

TEST 2.—Non-terminal fruit. Straight pick from branches, including fruits of all sizes. Picked 23–2–27.

(*a.*) 1 case placed in cold storage the same day.

Examined.	Total fruit.	% Pitted.	Increase in Cold Store.
23–2–27 ...	150 ...	2·0 ...	
11–3–27 ...	... ...	3·3 ...	
14–6–27 ...	... ...	16·0 ...	14·0%

This case was mislaid in the store and the April and May countings were missed.

(*b.*) 1 case placed in packing shed.

Examined.	Total fruit.	% Pitted.	Increase in ordinary store.
23–2–27 ...	148 ...	1·4 ...	
11–3–27 ...	... ...	9·6 ...	
11–4–27 ...	... ...	14·2 ...	
11–5–27 ...	... ...	15·5 ...	
14–6–27 ...	... ...	19·7 ...	18·3%

TEST 3.—Non-terminal fruit as in Test 2, and from same trees, but picked 10–3–27.

(*a.*) 1 case placed in cold storage the same day.

Examined.	Total fruit.	% Pitted.	Increase in Cold Store.
10–3–27 ...	158 ...	1·9 ...	
25–3–27 ...	... ...	2·5 ...	
26–4–27 ...	... ...	2·5 ...	
26–5–27 ...	... ...	3·2 ...	
14–6–27 ...	... ...	3·2 ...	1·3 %

(*b.*) 1 case placed in packing shed.

Examined.	Total fruit.	% Pitted.	Increase in ordinary store.
10–3–27 ...	157 ...	2·5 ...	
25–3–27 ...	... ...	5·1 ...	
26–4–27 ...	... ...	7·6 ...	
26–5–27 ...	... ...	7·6 ...	
14–6–27 ...	... ...	7·6 ...	5·1 %

The picking and counting was done by Orchard Inspector Flintoff, to whom we are much indebted.

The results of these tests support Smith's contention—

1. That early picking increases the development of Pit in store.
2. That cold storing soon after picking reduces the rate of Pit development.

The results also in our opinion definitely indicate, when taken in conjunction with Smith's own experiments and those quoted by him, that Bitter Pit does originate in apples after picking. Otherwise the later picked apples should have had at least as much Pit, and probably more than those picked earlier, as they had longer on the trees to be affected. The only explanation of the results is that Pit does develop after picking especially in apples picked early.

The tests also indicate that Pit tends to develop rapidly shortly after picking, and then the rate of development slows down.

The most important results are to indicate the desirability of removing, at least with Cleopatra, the terminal (centre apples of clusters) apples when thinning, and to delay picking at least to the first week of March or preferably to the second week.

Confirmatory evidence was accidently secured this year in regard to the relation of immaturity to Pit. Two cases of Cleopatra apples were obtained from Collie during the last week in January. They varied from under half to half grown. These were kept in an office at this Department. Much to our surprise these small immature fruits rapidly developed Pit and within two weeks were 100 per cent. Pitted, and very badly at that. A little Pit was actually showing four to five days after picking.

The results obtained in these tests have opened up avenues of investigation which promise important developments in our knowledge of Bitter Pit and similar diseases. These will be followed up during the coming season. In the meanwhile a tentative theory of the origin of Pit has been put forward which will be found elsewhere in this Journal. One point arising out of the tests may be touched upon. When in 1925 Smith carried out his tests in Tasmania in regard to the effect of cold storage in checking Pit, a similar test was carried out here at his request. The results were as under:—

Tasmania.	Ribston Pippins. 2½ inch.	Cox's Orange Pippin. 2¼ inch.
% Pit when picked	2 ...	2
% Pit after 30 days in cold store	13 ...	13
% Pit after 30 days in room (50° — 70°)	35 ...	76

Wooroloo—Western Australia.	Cleopatra.
% Pit when picked	30
% Pit after 30 days in cold store	71
% Pit after 30 days in room (60°—80°) ...	34

Smith included these tests in his articles, and offered an explanation of the contradictory results. Close examination of the data given by Smith indicates that his fruit was picked unusually early. In our experiment the fruit was picked unusually late, on 16th March. We therefore see that the fruit picked early by Smith in Tasmania in 1925, and that picked by us at ordinary picking time (23rd February and 10th March) at Bridgetown in 1927 gave the same results, namely, a reduction in the rate of Pitting in cold stores. That picked on 16th March, 1925, at Wooroloo gave less Pit in ordinary than in cold store. A simple explanation is now possible. Pit does not develop on either mature or ripe apples. Mature apples are those in which the starch which fills the cells of immature apples has been con-

verted into sugar. The 1925 Tasmanian and the 1927 West Australian apples were picked in an immature condition. Those placed in ordinary store had some weeks to go to reach maturity and developed Pit rapidly. Those in cold storage developed Pit more slowly. The West Australian apples picked in 1925 were nearly mature. Those in the room developed Pit, but reaching maturity in two to three days the development of Pit then stopped. Those placed in cold store were still green when removed in 30 days, and when placed in the same room as the former lot continued to develop Pit to the extent of a further six per cent. in four days and eight per cent. in six days when they matured.

Thus it is seen that cold storage does not stop Pit, but reduces its rate of development. Cold storage may even in very Pit-liable fruit increase the final amount of Pit by lengthening the time of susceptibility.

The important conclusions to be derived by growers from these investigations are—

1. Delay picking susceptible varieties. Cleopatras should not be picked before the first week in March in a normal season, and preferably in the second week.

2. The large terminal fruit (centres of clusters) should not be picked for export. Preferably they should be removed at thinning time.

3. The sooner susceptible varieties are in cold store after picking the less Pit will develop during the voyage in shipments overseas.

Reference—

Smith, A. J. M.—Bitter Pit in Apples. A Review of the Problem. Department of Scientific and Industrial Research. Food Investigation Special Report No. 28, London, 1926.

Our happiness mainly depends on the freedom that reigns within us: a freedom that widens with every good deed and contracts beneath acts of evil. Not metaphorically, but literally, does Marcus Aurelius free himself each time he discovers a new truth in indulgence, each time that he pardons, each time he reflects. Still less of a metaphor is it to declare that Macbeth enchains himself anew with every fresh crime. And if this be true of the great crimes of kings and the virtues of heroes, it is no less true of the humblest faults and most hidden virtues of ordinary life. Many a youthful Marcus Aurelius is still about us; many a Macbeth who never stirs from his room.—*Maeterlinck.*

WHEAT YIELDS COMPETITION, 1924-1926.

I. THOMAS,

Superintendent of Wheat Farms.

The Wheat Yields Competition was commenced in 1924 with the object of stimulating a healthy rivalry amongst farmers so as to increase their average yields over the whole of their farms, and also improve the general average yield of the district. It was realised, that although the number of competitors would be small when compared with the total number of wheat farmers in the State, yet a study of the methods of the competitors, with the object of learning how those by which the best crops were obtained, could be applied to other farms and better yields obtained. The competition was carried out in co-operation with the Royal Agricultural Society, and was rendered possible through the generosity of the two fertiliser companies (Messrs. Cuming, Smith & Company, Proprietary, Limited, and the Mount Lyell Chemical Company), who manufacture superphosphate in this State, and who donated the prizes.

In each zone cash prizes of £5 and £3, respectively, were awarded each year to the two competitors gaining the highest number of points for that year. At the end of the three years the competitor who had gained the highest aggregate number of points in the three years was awarded a "Championship Cup" valued at £20.

The Competition was designed to ensure, as far as possible, that it should be won as the result of merit only, and not because of accidental results due to a specially good season. For this reason the Competition was planned to extend over a period of three years—1924, 1925, and 1926.

For the purpose of the Competition the Wheat Belt was divided into three zones, which roughly approximated with the rainfall areas, as follow:—

No. 1 Zone (Early) with rainfall under 15 inches.

No. 2 Zone (Midseason) with rainfall over 15 inches, but under 20 inches.

No. 3 Zone (Late) with rainfall over 20 inches.

To ensure that the crops should be grown on strictly commercial lines, an essential condition was that the minimum area cropped should not be too small. It was, however, necessary that this minimum area should not be so great as to exclude the farmer who relied principally on his own efforts and did not employ labour. For these reasons the minimum area harvested for grain on the farm was fixed at 150 acres.

For the same reason factors other than yield were considered when making the awards. The scale of points on which the judging was, therefore, devised to give credit for good farming practice, and was as follows:—

	Points.
Yield	35
Freedom from weeds	25
Freedom from disease	15
Freedom from admixture	15
Evenness of growth	10
Total	100

The judging was carried out by officers of the Wheat Branch of the Department of Agriculture, and the method of judging, which was designed to eliminate as far as possible the element of estimation, and in the points awarded, to give credit for good farming practice, was as follows:—The judge visited the farm of each competitor, closely inspected the whole of the stripping area, and allotted points for freedom from weeds, disease, admixture of other varieties, and evenness of growth. When the harvesting had been completed, and the crop disposed of, the competitor advised the judge and forwarded to him the number of bushels obtained from the area, and also the number disposed of and retained for seed. Before making the award the area stripped was checked and the quantity of grain harvested was verified—that which was sold—by means of the merchants' tally notes. Having the total yield and the measured stripped area, the judge calculated the average yield per acre of the farm. Points were then awarded accordingly, added to those already given, and the farmer gaining the highest aggregate number was adjudged the winner.

In order to call the attention of the farmers to the Competition, and also to overcome the inevitable initial difficulties which would undoubtedly occur in the first year of such a competition, which was rather different from any competition previously held in the Commonwealth, a preliminary competition, for one year only, was arranged in 1923.

THE 1924 COMPETITION.

In the first year of the Competition under review 35 entries were received, 17 in both No. 1 and 2 Zones, and only one in No. 3 Zone. Of these one withdrew in No. 1 Zone and three in No. 2 Zone. There was thus 31 farmers who entered the Competition and completed the first year's test. Mr. W. O. Sewell, of Pingelly, who was the only competitor in No. 3 Zone, generously withdrew and forfeited the advantage he had of a "walkover," thus rendering possible a new competition extending over a period of two years.

The following table shows the prize winners and the points awarded in the first year of the Competition:—

Competitor.	District.	Acreage.	Average yield per acre.	Yield.	Freedom from weeds.	Freedom from disease.	Freedom from admixture.	Evenness of growth.	Total.
				35	25	15	15	10	100
No. 1 ZONE.			bus. lbs.						
Lindsay, J. ...	Wyalcatchem	390	26 35	27	21	13	13	7	81
Dunkley, G. ...	Yelbeni ...	500	25 55	26	21	13	12	7	79
Hughes Bros.	Minnivale ...	347	24 15	24	21	13	13	7	78
Hammond, J. D.	Kellerberrin	567	23 9	23	21	13	13	7	77
Lethlean, J. ...	Bruce Rock	390	24 3	24	21	12	13	7	77
McCarthy, P. & Son	Eujinyn ...	765	23 49	24	20	12	13	7	76
Dumsday, L.	Goomarin	335	21 25	21	19	12	12	6	70
Ball, H. ...	Yelbeni ...	600	19 11	19	18	12	11	6	66
Spillman, J. W.	N. Baandee	510	18 13	18	18	12	11	6	65
Spillman, D. J.	do. ...	410	17 24	17	18	12	11	6	64
McManus Bros.	N. Bencubbin	385	11 38	12	21	13	12	6	64
Pollock, R. ...	Belka ...	541	14 54	15	18	11	12	6	62
McLellan, J. ...	Mt. Stirling	360	14 47	15	18	12	11	6	62
Lehmann, C. E.	Dukin ...	600	13 2	13	18	12	12	6	61
Bradford, R. & L.	Ballidu ...	395	10 25	10	18	12	12	6	58
Bell Bros. ...	Dalwallinu	1,410	14 56	15	15	12	8	5	55
No. 2 ZONE.									
Keays, P. ...	Corrigin ...	495	25 29	25	23	12	12	8	80
Bowen, T. ...	Wongan Hills	544	26 31	27	20	11	12	7	77
Dall, S. C. ...	Quairading	286	21 6	21	21	13	13	8	76
Morrell Bros.	Greenough	215	23 7	23	19	13	13	8	76
Ackland, R. B.	Wongan Hills	352	20 41	21	21	13	12	8	75
Carter & Son ...	Three Springs	241	25 35	26	18	12	12	7	75
Richards, T. ...	Dangin ...	195	22 0	22	20	12	12	8	74
Hayward, A. L.	Dindiloa ...	230	15 7	15	22	14	14	8	73
Elder, A. ...	Moulyinning	361	21 16	21	19	13	12	7	72
Spencer & Son	Wongan Hills	264	22 53	23	19	11	12	7	72
Mott, C. ...	Moulyinning	178	20 37	21	19	13	12	7	72
Gottsch Bros.	Dudinin ...	617	15 53	16	20	13	13	7	69
Nicholls, Robt.	Kondinin ...	426	14 8	14	19	12	12	7	64
Hebiton & Sons	Three Springs	*218	* *	*	19	13	12	8	52
No. 3 ZONE.									
Sewell, W. O.	Pingelly ...	295	14 0	15	22	12	13	7	69

* Half of this competitor's acreage was destroyed by hail.

It is worthy of note that the average yield of 26 bushels 35 lbs. per acre harvested on the farm of Mr. J. Lindsay, at Wyalcatchem, was the highest yield recorded in the Competition in 1924, although it was closely challenged by that of Mr. T. Bowen, of Wongan Hills, with an average of 26 bushels 31 lbs. from 544 acres. A review of the results, together with the judges' reports, will be found in the *Journal of Agriculture*, June, 1925.

THE SECOND YEAR OF THE COMPETITION, 1925.

In the second year of the Competition five of the 16 competitors in No. 1 Zone, who had fully complied with the conditions in 1924, withdrew, and four of the 14 in the No. 2 Zone. The entries received for the newly arranged two-year competition in No. 3 Zone, rendered possible by the generosity of Mr. W. O. Sewell, of Pingelly, who, as previously stated, withdrew in 1924 and forfeited the advantage he had of being the only entrant in the first year, were very disappointing, three only being received, including that of Mr. Sewell.

The prizes and points awarded in the Competition during the second year are shown hereunder:—

1925.

No. 1 ZONE.

Competitor.	District.	Acreage.	Average yield per acre.	Maximum points allocated for— Yield.	Freedom from weeds.	Freedom from disease.	Freedom from admixture.	Evenness of growth.	Total.
	Points ...	...	...	35	25	15	15	10	100
			bus. lbs.						
Hughes Bros....	Minnivale ...	323	21 54	22	21	13	13	8	77
Hammond, J. D.	Kellerberrin	489	22 26	22	21	13	13	8	77
Lindsay, J. ...	Wyalcatchem	380	23 24	23	21	12	12	8	76
McCarthy, P. & Son	Eujinyn ...	755	16 3	16	20	13	13	7	69
Lethlean, J. ...	Bruce Rock	366	14 6	14	20	13	13	7	67
Bradford, R. & L.	Ballidu ...	484	13 9	13	19	13	12	7	64
Spillman, J. W.	North Baandee	275	15 7	15	17	12	11	6	61
Spillman, D. J.	do. ...	285	13 34	14	17	12	11	6	60
McLelland, J.	Mt. Stirling	360	14 2	14	17	12	11	6	60
Lehmann, C. E.	Dukin ...	520	14 14	14	17	12	11	6	60
Ball, H. ...	Yelbeni ...	676	12 35	13	18	12	10	6	59
Dunkley, G. ...	do. ...	...	Withdrawn.						
Dumsday, L.	Goomarin ...	...							
McManus Bros.	N. Bencubbin	...							
Pollock, R. ...	Belka ...	...							
Bell Bros. ...	Dalwallinu	...							

No. 2 ZONE.

Competitor.	District.	Acreage.	Average yield per acre.	Maximum points allocated for— Yield.	Freedom from weeds.	Freedom from disease.	Freedom from admixture.	Evenness of growth.	Total.
	Points	...	...	35	25	15	15	10	100
			bus. lbs.						
Richards, T. ...	S. Caroling, *via* Dangin	199	26 56	27	21	14	13	9	84
Hebiton & Sons	Three Springs	360	23 49	24	20	13	13	8	78
Morrell Bros.	Greenough	252	22 25	22	21	13	14	7	77
Elder, A. ...	Moulyinning	175	21 35	22	20	13	13	8	76
Ackland, R. B.	Wongan Hills	295	20 40	21	20	13	14	8	76
Carter & Son ...	Three Springs	263	22 22	22	20	12	13	7	74
Spencer & Son	Wongan Hills	261	20 53	21	20	13	12	8	74
Mott, C. ...	Moulyinning	223	21 8	21	19	13	12	8	73
Dall, S. C. ...	Quairading	465	19 59	20	20	13	12	8	73
Hayward, A. L.	Dindiloa ...	330	14 59	15	21	12	14	8	70
Keays, P. ...	Corrigin ...	...	Withdrawn.						
Bowen, T. ...	Wongan Hills	...							
Gottsch Bros.	Dudinin ...	...							
Nicholls, Robt.	Kondinin ...	...							

No. 3 ZONE.

Competitor.	District.	Acreage.	Average yield per acre.	Maximum points allocated for— Yield.	Freedom from weeds.	Freedom from disease.	Freedom from admixture	Evenness of growth.	Total.
	Points ...	...	...	35	25	15	15	10	100
			bus. lbs.						
Sewell, W. O....	Pingelly ...	291	19 48	20	19	12	12	8	71
Clifford, M. ...	Gillimanning	276	12 18	12	19	12	13	6	62
Taylor, B. ...	Kulyalling	207	13 23	13	16	13	12	7	61

The average yield of 26 bushels 56 lbs. per acre produced by Mr. T. Richards is a particularly good one, and is the highest harvested during the whole period of the Competition.

The opportunity is taken here to correct an error in the results of No. 1 Zone, published in the June, 1926, *Journal of Agriculture*. The points awarded to Mr. J. Deane Hammond for "Freedom from Admixture" should read 13 and not 12 as published.

The judges' reports and a review of the results will be found in the *Journal of Agriculture* for June, 1926.

The position and points of the three leading competitors in each zone at the end of the second year was as follows:—

TABLE SHOWING POINTS OF LEADING COMPETITORS IN ALL ZONES AT THE END OF THE SECOND YEAR—1925.

Competitor.	District.	1924. Acreage.	1924. Average yield per acre.	1924. Total points awarded.	1925. Acreage.	1925. Average yield per acre.	1925. Total points awarded.	Aggregate points, 1924-25.
			bus. lbs.			bus. lbs.		
No. 1 ZONE.								
Lindsay J. ...	Wyalcatchem	390	26 35	81	380	23 24	76	157
Hughes Bros. ...	Minnivale ...	347	24 15	78	323	21 54	77	155
Hammond, J. D....	Kellerberrin	567	23 9	77	489	22 26	77	154
No. 2 ZONE.								
Richards, T. ...	Sth. Caroling	195	22 0	74	199	26 56	84	158
Morrell Bros. ...	Greenough ...	215	23 7	76	252	22 25	77	153
Ackland, R. B. ...	Wongan Hills	352	20 41	75	295	20 40	76	151
No. 3 ZONE.								
Sewell, W. O. ...	Pingelly ...	...	...	...	291	19 48	71	...
Clifford, M. ...	Gillimanning	...	...	...	276	12 18	62	...
Taylor, B. ...	Kulyalling ...	...	...	...	207	13 23	61	...

THE FINAL YEAR OF THE COMPETITION, 1926.

The final year was one of very keen but healthy rivalry amongst the competitors who completed the final year. Of the 24 competitors who fully complied with the conditions of the Competition in 1925, five of them withdrew in 1926—one in No. 1 Zone, three in No. 2 Zone, and one in No. 3 Zone—leaving 10, seven, and two competitors in the respective zones.

The following table shows the rainfall recorded during 1926 in the districts where the competitors were situated:—

RAINFALL, 1926.

Competitor.	District.	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Total Rainfall.
						May.	June	July.	Aug.	Sept.	Oct.				
ZONE No. 1.															
ammond, J. D.	Kellerberrin	2	24	259	143	105	208	408	168	131	119	1,139	35	2	1,604
ndsay, J. ...	Wyalcatchem	36	30	123	122	145	197	401	158	114	112	1,127	66	46	1,550
ughes Bros. ...	Minnivale ...	15	36	157	154	138	182	407	114	130	118	1,089	87	33	1,571
cCarthy & Son	Eujinyn ...	6	18	215	120	73	176	405	121	146	195	1,116	44	9	1,528
thlean, J. ...	Bruce Rock	...	28	208	127	115	192	430	124	142	120	1,123	31	12	1,529
umsday, L. ...	Talgomine Downs	...	173	274	74	85	156	314	120	139	87	901	21	29	1,472
radford Bros.	Ballidu ...	23	19	95	153	154	303	300	123	74	77	1,031	152	20	1,493
all, H. ...	Yelbeni ...	36	30	123	122	145	197	401	158	114	112	1,127	66	46	1,550
pillman, J. W.	Nth. Baandee	18	25	190	90	170	173	333	97	92	77	942	46	14	1,325
pillman, J. D.	do.														
ZONE No. 2.															
arter & Sons ...	Three Springs	3	33	102	171	157	273	376	160	118	105	1,189	157	47	1,702
ebiton & Sons	do.														
ckland, R. B.	Wongan Hills	22	11	111	136	143	256	439	179	112	137	1,266	120	...	1,666
ichards, T. ...	Sth. Caroling	...	138	147	129	99	198	586	104	151	178	1,316	77	6	1,813
orrell Bros ...	Greenough ...	9	3	20	227	222	395	512	168	187	57	1,541	115	...	1,915
ider, A. ...	Moulyinning	7	45	296	192	189	170	357	99	200	137	1,152	57	82	1,831
ott, C. ...	do.														
ZONE No. 3.															
ewell, W. O. ...	Pingelly ...	23	63	217	280	369	250	719	135	300	208	1,981	83	25	2,672
lifford, M. ...	Wickepin ...	26	16	397	189	243	262	571	137	236	195	1,644	78	51	2,401

The judging was carried out on the same basis as in the two previous years, and the reports and the awards of the judges are shown hereunder:—

No. 1 ZONE.

The judge in No. 1 Zone was Mr. J. H. Langfield, Manager of the Merredin Experiment Farm, whose award and report are as follow:—

Competitor.	District.	Acreage.	Average yield per acre.	Yield.	Freedom from weeds.	Freedom from disease.	Freedom from admixture.	Evenness of growth.	Total.
	Points ...	...	...	35	25	15	15	10	100
			bus. lbs.						
Hammond, J. D.	Kellerberrin	781	20 43	21	22	14	14	8	79
Lindsay, J. ...	Wyalcatchem	472	19 35	20	22	12	14	7	75
Hughes Bros. ...	Minnivale ...	342	18 15	18	22	14	14	7	75
McCarthy & Son	Eujinyn ...	803	17 51	18	21	13	13	8	73
Lethlean, J. ...	Bruce Rock	386	16 16	16	22	13	13	8	72
Dumsday, L. ...	Goomarin ...	396	14 4	14	21	14	14	9	72
Bradford Bros.	Ballidu ...	850	15 18	15	21	13	13	7	69
Spillman, J. W.	N. Baandee	835	12 30	13	22	14	13	7	69
Ball, H. ...	Yelbeni ...	939	15 21	15	21	12	13	7	68
Spillman, D. J.	N. Baandee	1,060	10 19	10	21	13	12	7	63
McLellan, J. ...	Mt. Stirling	Withdrawn.							

Mr. J. Deane Hammond, of Kellerberrin, secured first place this year with 75 points. The total area harvested for grain was 781 acres, the average yield being 20 bushels 43 lbs. per acre, undoubtedly a splendid yield over such a large area. The varieties of wheat grown were "Nabawa," "Gluyas Early," "Merredin," and "Canberra." The land on which the crops

were sown was Gimlet and Salmon Gum country, all of which had been fallowed. It was ploughed to a depth of 3½ to 4½ inches, the operation being commenced towards the end of May and completed early in September, two tractors and three teams of horses being used. It was cultivated during the months of October and November, and again prior to planting, which commenced towards the latter part of April and finished during May. Combine and ordinary drills were used, and some parts of the area seeded were harrowed after planting, and some rolled. The rate of seeding ranged between 66 and 90 lbs. per acre, and superphosphate was applied at the rate of 90 to 112 lbs. per acre. All the seed was graded and dry pickled at the rate of two ounces of copper carbonate per bushel. Mr. Hammond crops on a four-year rotation, viz., fallow, wheat, oats, and pasture. His crops were very clean and free from weeds and disease, and it is a generally accepted fact that the better the crop, the fewer the weeds. There were a few weeds, the most noticeable being an odd plant of cockspur and some Cape weed.

Mr. J. Lindsay, of Wyalcatchem, was the second prize winner in this zone. He harvested 472 acres for grain, and averaged 19 bushels 35 lbs. per acre, the whole crop being on fallow. The whole of the land cropped, with the exception of 100 acres which were ploughed in August with a Sundercut, was fallowed during June and July, 1925, with a Mouldboard plough—the fallow receiving three cultivations before planting. The varieties grown were "Nabawa," "Gluyas Early," "Merredin," and "Federation," the seed being graded and dry pickled. The rate of seeding was from 55 to 60 lbs. per acre, with 100 lbs. of superphosphate per acre. This farm is cropped on a four-year rotation, viz., fallow, wheat, oats, and stubble. Heavy rains had damaged the crop about considerably, the "Gluyas Early" being down rather badly. Sheep had also done a fair amount of damage. All the varieties were very free from admixture, and there were also very few weeds, but "Take-all" was rather bad in all the paddocks.

The total area harvested for grain by Messrs. Hughes Bros., of Minnivale, who obtained the third place, was 342 acres, and of this all but 15 acres was on fallow. The land was fallowed from June to August, 1925, and worked with a Sundercut in spring, harrowed after rain in March, and then cultivated with a Springtyne cultivator before planting, and harrowed after the drill. Seeding commenced towards the latter end of April, and was finished by the end of May. The rate of seed throughout was 45 lbs. per acre, the seed being both graded and dry pickled. With the exception of 82 acres of "Sailor's Fortune," the whole area was planted with "Nabawa." Superphosphate was applied at the rate of 112 lbs. per acre. Messrs. Hughes Bros. employ a three-year rotation, viz., fallow, wheat and stubble. The crops were very free from weeds, there was little or no admixture, and the only disease noticed was an odd very small patch of "Take-all."

In the following table a summary of the cultural methods of the various competitors in the No. 1 Zone is given:—

WHEAT YIELDS COMPETITION, 1926.—SUMMARY OF CULTURAL METHODS.—ZONE No. 1.

Competitor.	District.	Acreage.	Yield per acre.	Area sown on fallow.		Time of fallowing.	Cultivations of fallow.	Rotation.	Varieties.	Date planted.	Rate of seed per acre.	Rate of superphosphate per acre.	Method of pickling seed.	Graded.
				Acres.	Per cent.									
1. Hammond, J. D.	Kellerberrin	781	bus. lbs. 20 43	781	% 100	End of May to end of August	Cultivated during October and November, and prior to seeding; harrowed after planting	Four year—Fallow, Wheat, Oats and Pasture	Nabawa, Gluyas Early, Merredin, Canberra	End of April and May	lbs. 66-90	lbs. 90–112	Dry	Graded
2. Lindsay, J. ...	Wyalcatchem	472	19 35	472	100	June to August	Cultivated three times before planting	Four year—Fallow, Wheat, Oats, Stubble	Nabawa, Gluyas Early, Merredin, Federation	Late in April and during May	55-60	100	Dry	Graded
3. Hughes Bros.	Minnivale ...	342	18 15	327	96	June to August	Sundercut in Spring; harrowed after rain in March; Springtyne before planting; harrowed after drill	Three year—Fallow, Crop, Stubble	Nabawa, Sailor's Fortune	End of April to end of May	45	112	Dry	Graded
4. McCarthy & Sons	Eujinyn ...	803	17 51	803	100	June to August	Portion cultivated three times, balance once	Two year—Very early Fallow and Crop	Nabawa, Gluyas Early and Gluyas Late	Last week April to end May	45	90	Dry	Graded
5. Lethlean, J. ...	Bruce Rock	386	16 16	175	45	July and August	Cultivated in September and twice before seeding	Two year—Fallow, Crop	Nabawa, Gluyas Early, Merredin	Late in April and during May	45	90	Dry (seed plots only)	Graded
6. Dumsday, L.	Goomarin ...	396	14 4	316	80	July and August	Cultivated in Spring and some twice before seeding, and some once	Two year—Fallow, Crop	Nabawa, Gluyas Early, Gresley	Late in April, during May and 80 acres in June	45	90	Dry	Graded
7. Bradford Bros.	Ballidu ...	850	15 18	800	94	June to August	Cultivated in Spring and prior to seeding	Two year—Fallow Crop	Nabawa, Merredin, Yandilla King	Middle of April and early in May	55-60	90-130	Dry	Graded
8. Spillman, J. W.	Nth. Baandee	835	12 30	665	80	June and July	Skimmed in September and October; Springtyne before seeding	Two year—Fallow, Crop	Nabawa, Gluyas Early, Merredin	During May and until 16th June	50	90	Portion only dry	Re-cleaned
9. Ball, H. ...	Yelbeni ...	939	15 21	939	100	July to September	Cultivated in September and before seeding	Two year—Fallow, Crop	Nabawa, Gluyas Early, Merredin	1st week April to 15th June	60	90	...	...
10. Spillman, D. J.	Nth. Baandee	1,060	10 19	600	57	July and August	Cultivated before seeding only	Two year—Fallow, Crop	Nabawa, Gluyas Early, Merredin	11th May to 18th June	45	90	Dry	Graded
		6,864	15 32	5,878	85									

No. 2 ZONE.

The judging in this zone was done by myself, and the awards made and points allotted are as set out in the table hereunder:—

Competitor.	District.	Acreage.	Average yield per acre.	Yield.	Freedom from weeds.	Freedom from disease.	Freedom from admixture.	Evenness of growth.	Total.
	Points ...	...	...	35	25	15	15	10	100
			bus. lbs.						
Carter & Sons...	Three Springs	232	25 6	25	21	14	13	8	81
Ackland, R. B.	Wongan Hills	473	22 35	23	21	14	14	7	79
Richards, T. ...	S. Caroling	233	22 50	23	21	13	12	7	76
Morrell Bros. ...	Greenough	243	20 44	21	20	13	13	7	74
Elder, A. ...	Moulyinning	358	18 39	19	20	13	13	7	72
Mott, C. ...	Moulyinning	222	19 57	20	19	13	13	7	72
Hebiton & Sons	Three Springs	524	15 58	16	20	13	13	7	69
Spencer & Sons	Wongan Hills	With drawn.							
Dall, S. C. ...	Quairading	With drawn.							
Hayward, A. L.	Dindiloa ...	With drawn.							

The winning crop—that of Messrs. Carter & Sons, of Three Springs—was well grown, even and dense; its apearance, however, was marred by portions of it lodging. The land, which originally carried York Gum, had been cropped four times previously. For this crop the land was ploughed three inches deep during the months of June, July, and August with a Shearer disc plough. The condition of the land for this work was good until towards the last when it became too hard. After ploughing it was disc cultivated in September and again in March, and was planted with a "combined" cultivator drill, which operation commenced the last week in April, and was completed the last week in May. The varieties sown were "Nabawa," "Federation," "Huff's Imperial," and "Clarendon.' The seed, which was sown at the rate of 55 lbs. per acre, had been re-cleaned and treated with copper carbonate for the prevention of "smut." Superphosphate was applied at the rate of 90 lbs. per acre.

Mr. R. B. Ackland, of Wongan Hills, was awarded second place. The general system of cropping on this farm up to the present, has been to fallow new land and crop it at least twice before fallowing it again, and, as circumstances permit, working into a four-year rotation of fallow, wheat, oats and stubble. For this year's competition 473 acres were harvested. The land on which the crop was grown included various types of soil ranging from sandplain to heavy forest country, some of which had grown up to 10 crops, whilst a portion of it was new land. The crop as a whole was well grown, but was not so even or so dense as that gaining first place. Of the area cropped 300 acres had been ploughed with a Mouldboard plough to a depth of four inches during the months of June, July, and August the previous year, and had been cultivated during August and September and again in March and April. Portion was planted with a disc drill, and the remainder with a combine cultivator drill. The unfallowed area was ploughed two to three inches deep after rain during the autumn prior to planting. The varieties grown were "Nabawa," "Gluyas Early," "Merredin," "Florence," "S.H.J.," and "Carrabin." All the seed was graded, but only that which was required for seed purposes the following year was treated with copper carbonate for the prevention of "smut." The rate of seeding varied from 40 to 60 lbs. per acre. Superphosphate was applied at the rate of 128 lbs. per acre.

In the following table a summary of the cultural methods of the various competitors in the No. 2 Zone is given:—

WHEAT YIELDS COMPETITION, 1926.

SUMMARY OF CULTURAL METHODS.—ZONE No. 2.

Competitor.	District.	Acreage.	Yield per acre.	Area sown on fallow.		Time of fallowing.	Cultivations of fallow.	Rotation.	Varieties.	Date planted.	Rate of seed per acre.	Rate of superphosphate per acre.	Method of pickling seed.	Graded.
				Acres.	Per cent.									
			bus. lbs.		%						lbs.	lbs.		
Richards, T. ...	Sth. Caroling	233	22 50	163	70	July to August	Immediately after ploughing; after rain in Summer and prior to seeding	Four year—Fallow, Wheat, Oats, Stubble	Nabawa, Gluyas Late, Baroota Wonder	During May	45-60	112	Dry	Graded
Ackland, R. B.	Wongan Hills	473	22 35	300	63	June to August	Cultivated in August, September, March, and April	Two year—Fallow, Crop—working into a four year	Nabawa, Gluyas Early, Merredin, Florence, S.H.J. Carrabin	Middle of April to end of May	40-60	128	Dry (seed plots only)	Graded
Carter & Sons	Three Springs	232	25 6	232	100	July to August	Disced during September and again in March	Three years—Fallow, Crop, Pasture	Nabawa, Federation, Huff's Imperial-Clarendon	From 3rd week April to end of May	55	99	Dry	Re-cleaned
Morrell Bros.	Greenough ...	243	20 44	157	65	July to August	Cultivated in September during March and before seeding; harrowed after seeding	Three year—Fallow, Crop, Stubble	Nabawa, Toby's Tusk, Gresley	Last week April to end June	60	56	Portion with Bluestone	Re-cleaned
Elder, A. ...	Moulyinning	358	18 39	358	100	June to August	Skimploughed in September, October, and prior to drilling; harrowed after drilling	Four year—Fallow, Wheat, Oats, Stubble	Nabawa, Gluyas Early, Merredin	First week April to 24th May	45-60	100	Dry	Graded
Mott, C. ...	Moulyinning	222	19 57	222	100	June to August	Disc cultivated prior to seeding	Four year—Fallow, Wheat, Oats, Stubble	Nabawa, Gluyas Early, Merredin	From 1st week May to 2nd week June	45	112	Dry	Graded
Hebiton & Son	Three Springs	524	15 58	*Nil*	...	...	... ...	... ...	Nabawa, Gluyas Early, Merredin	Last week May to end of June	60	56-112	Dry	Re-cleaned
		2,285	20 21	1,432	63									

No. 3 ZONE.

The Judge in No. 3 Zone was Mr. H. Rudall, Field Officer, whose reports and award are as follow:—

The Competition in No. 3 Zone differs slightly from the other Zones. When this Competition was initiated entries were invited from the three Zones of the Wheat Belt. Mr. W. O. Sewell's (of Pingelly) entry was the only one received from No. 3 Zone, and in a sportsmanlike manner, at the close of the first year, he generously withdrew and forfeited the advantage he had gained of a "walkover" for the two succeeding years.

A new Competition then became possible, extending over a period of two years. Fresh entries were invited, but the response was not what it should have been, as only three entries were received. During the second year Mr. Bert Taylor (Kulyalling) withdrew his entry owing to having sold his property. This left Mr. W. O. Sewell (Pingelly) and Mr. M. Clifford (Gillimanning) to contest the right to claim the Champion Cup.

Owing to the undulating and broken nature of the paddocks by gullies and outcrops in these districts, sheep may be said to return a greater revenue than wheat growing. It has been invariably shown that a wet year may be beneficial to Zone No. 1 and part of No. 2 to increase one's yield, but a rainfall in Zone 3 of a moderate average will be more beneficial for a greater revenue from wheat than a wet year. Hence, last year, owing to the vagaries of the season, the return without sheep would not have been very remunerative. It must be disappointing, owing to the necessary workings that are required in this class of country to have it in good tilth at seeding time, not to receive adequate remuneration.

In the last year Mr. Sewell gained a substantial advantage over Mr. Clifford in points for yield, but during this last and final year the climatic conditions affected both competitors alike, hence Mr. Sewell maintained his advantage and secured the Champion Cup.

The awards are as follows:—

Competitor.	District.	Acreage.	Average yield per acre.	Yield.	Freedom from weeds.	Freedom from disease.	Freedom from admixture.	Evenness of growth.	Total.
	Points ...	...	...	35	25	15	15	10	100
			bus. lbs.						
Sewell, W. O. ...	Pingelly ...	310	10 57	11	19	12	12	7	61
Clifford, M. ...	Gillimanning	300	10 21	10	19	12	12	7	60
Taylor B. ...	Kulyalling	Withdrawn—Property sold.							

Mr. W. O. Sewell's property is situated about 2½ miles from Pingelly, and comprises about 3,000 acres, of which 2,400 are cleared. The wheat crop grown on fallowed land comprised 310 acres. There were also 160 acres under oats; 70 acres peas and oats; and 90 acres rape and oats. The

general system of cropping is a three-years' rotation. The favourite varieties are "Federation" and "Gresley," and two six-horse teams were used to carry out the cultural work. The fallowed land was ploughed from July to September, 1925, with a Mouldboard plough 4in. deep; it was cultivated with a Springtyne cultivator in September and again prior to seeding, and sown in April and May with 50 to 60 lbs. of seed and 90 lbs. of superphosphate per acre; 1,800 to 2,000 sheep were pastured on the property, but the crops were not fed off. The crops were well grown in spite of the weeds which were very prolific in places, and, had the climatic conditions been congenial for the setting of the grain, the yield should have been nearer the previous year's return.

The other entry, and consequently the second prize winner, was Mr. M. Clifford. His property is situated in the Gillimanning area, 12½ miles from Wickepin. The country is similar to Mr. Sewell's, undulating and broken, and sheep also are a great factor in producing revenue. The area of the holding is 4,750 acres, of which 3,000 are cleared. About 400 acres were cropped, including 60 acres of oats and 44 acres cut for hay, leaving 300 stripped for wheat; 316 acres of the total were fallowed. The land was ploughed with a Mouldboard plough 4in. to 5in. deep in July, August and September. The subsequent cultivations were given in September, March, and prior to seeding with a Springtyne cultivator. Seeding took place in May, 75 lbs. of seed and 120 lbs. superphosphate per acre being used. The general system of cropping is fallow, crop and about three years' "lie" out. Two six-horse teams are used to carry out the cultural work. The favourite varieties are "Federation" for grain and "Baroota Wonder" for hay. 2,500 sheep are pastured on the property.

The vagaries of the season were also felt by Mr. Clifford in preventing him obtaining that return which appeared likely to the eye, but which was not harvested.

The cultural details are summarised in the table hereunder:—

WHEAT YIELDS COMPETITION, 1926.

SUMMARY OF CULTURAL METHODS.—ZONE No. 3.

Competitor.	District.	Acreage.	Yield per acre.	Area sown on fallow.		Time of fallowing.	Cultivations of fallow.	Rotations.	Varieties.	Date planted.	Rate of seed per acre.	Rate of superphosphate per acre.	Method of pickling seed.	Graded
				Acres.	Per cent.									
			bus. lbs.		%						lbs.	lbs.		
Sewell, W. O.	Pingelly ...	310	10 57	310	100	July to September	Cultivated in September and again prior to seeding	Three year—Fallow, Crop, Stubble	Federation, Gresley	April and May	60	90	Dry	Graded
Clifford, M. ...	Gillimanning	300	10 21	300	100	July to September	Cultivated in September-March and prior to seeding	Two year—Fallow, Crop, and three years' Pasture	Federation, Baroota Wonder	May ...	75	120	Dry	Graded
		610	10 29	610	100									

CHAMPIONSHIP AWARDS.

The following table shows the points awarded to the competitors during the three years of the Competition:—

TABLE SHOWING YIELDS, 1924–26.

ZONE No. 1.

Competitor.	Address.	1924.			1925.			1926.			Average.		
		Useful Rainfall.	Acreage.	Yield per Acre.	Useful Rainfall.	Acreage.	Yield per acre.	Useful Rainfall.	Acreage.	Yield per acre.	Average Useful Rainfall, 1924-1926.	Total Acreage.	Average yield per acre.
				B. L.			B. L.			B. L.			B. L.
Hammond, J. D.	Kellerberrin	1,000	567	23 9	789	489	22 26	1,139	781	20 43	976	1,837	21 55
Lindsay, J. ...	Wyalcatchem	1,016	390	26 35	771	380	23 24	1,127	472	19 35	971	1,242	22 57
Hughes Bros.	Minnivale ...	1,016	347	24 15	771	323	21 54	1,089	342	18 15	959	1,012	21 28
McCarthy & Son	Eujinyn ...	1,107	765	23 49	795	755	16 3	1,116	803	17 51	1,006	2,323	19 14
Lethlean, J. ...	Bruce Rock	1,107	390	24 3	795	366	14 6	1,123	386	16 16	1,008	1,142	18 14
Dumsday, L.	Goomarin ...	676	335	21 25	544	310	6 23	901	396	14 4	707	1,041	14 9
Spillman, J. W.	N. Baandee	971	510	18 13	789	275	15 7	942	835	12 30	867	1,620	14 45
Ball, H. ...	Yelbeni ...	1,016	600	19 11	771	676	12 35	1,127	939	15 21	971	2,215	15 33
Bradford Bros.	Ballidu ...	919	395	10 25	1,075	484	13 9	1,051	850	15 18	1,015	1,729	13 35
Spillman, J. D.	N. Baandee	971	410	17 24	789	285	13 34	942	1,060	10 19	901	1,755	12 30
		...	4,709	20 58	...	4,343	15 54	...	6,864	15 32	...	15,916	17 15

ZONE No. 2.

Competitor.	Address.	1924.			1925.			1926.			Average.		
		Useful Rainfall.	Acreage.	Yield per acre.	Useful Rainfall.	Acreage.	Yield per acre.	Useful Rainfall.	Acreage.	Yield per acre.	Average useful Rainfall,	Total acreage.	Average yield per acre.
				B. L.			B. L.			P. L.			B. L.
Richards, T. ...	S. Caroling ...	909	195	22 0	801	199	26 56	1,316	233	22 50	1,009	627	23 53
Ackland, R. B.	Wongan Hills	1,089	352	20 41	1,075	295	20 40	1,266	473	22 35	1,143	1,120	21 29
Carter & Son ...	Three Springs	1,216	241	25 15	1,117	263	22 22	1,189	232	25 6	1,173	736	24 17
Morrell Bros.	Greenough ...	1,457	215	23 7	1,739	252	22 25	1,541	243	20 44	1,579	710	22 8
Elder, A. ...	Moulyinning	1,133	361	21 16	801	175	21 35	1,152	258	18 39	1,065	794	20 29
Mott, C. ...	do. ...	1,133	178	20 37	801	223	21 8	1,152	222	19 57	1,065	623	20 34
Hebiton & Son	Three Springs	1,216	218	14 30	1,117	360	23 49	1,189	524	15 58	1,173	1,102	18 14
		...	1,760	21 9	...	1,767	22 40	...	2,185	20 21	...	5,712	21 19

ZONE No. 3.

Competitor.	Address.	1925.			1926.			Average.		
		Useful Rainfall.	Acreage.	Yield per acre.	Useful Rainfall.	Acreage.	Yield per acre.	Average useful Rainfall.	Acreage.	Average yield per acre.
				B. L.			B. L.			B. L.
Sewell, W. O.	Pingelly ...	961	291	19 48	1,981	310	10 57	1,471	601	15 4
Clifford, M. ...	Gillimanning	948	276	12 18	1,644	300	1021	1,346	576	11 17
		...	567	16 9	...	610	10 29	...	1,177	13 13

It will be seen that the Championship Cups, each valued at £20, donated by Messrs. Cumming Smith & Co., Pty., Ltd., and the Mt. Lyell Chemical Co., for the competitors gaining the highest aggregate points in each Zone, were won by the following:—

Zone No. 1.—Mr. J. Deane Hammond, Kellerberrin—233 points.

Zone No. 2.—Mr. T. Richards, South Caroling—234 points.

Zone No. 3.—Mr. W. O. Sewell, Pingelly—132 points.

As previously stated the Competition in No. 3 Zone was for a duration of two years only.

With the close of the Competition, it is desirable that the methods adopted should be reviewed.

FALLOWING.

A feature of the last year of the Competition was the high percentage of the crops, representing the whole of the competitor's crops, sown on fallowed land. Of the total area of 9,759 acres sown, no less than 7,920 acres were on fallowed land, equivalent to 81 per cent., while the figure for the whole Wheat Belt was 50 per cent. The whole of the wheat crop of each of the competitors in Zone No. 3, and also three competitors in each of the other Zones, was planted on fallow, while the averages were 85 per cent. in No. 1 Zone, 63 per cent. in No. 2 Zone, and 100 per cent. in No. 3 Zone. There was, however, one competitor who planted the whole of his crop on unfallowed land. These figures are summarised in the following table:—

Zone.	No. of Competitors.	Area of Wheat sown.	Area of Wheat sown on fallow.	Per cent. on fallow.
		acres.	acres.	%
No. 1 Zone	10	6,864	5,878	85
No. 2 Zone	7	2,285	1,432	63
No. 3 Zone	2	610	610	100
Total	19	9,759	7,920	81
Whole State	...	2,781,805	1,378,500	50

There was a marked similarity in the implement used and the methods adopted for ploughing. The most popular implement for this purpose was the Mouldboard plough, but in this connection it is pointed out that the nature of the soil is one of the deciding factors as to which type of implement is to be used. The important point, however, is to do the work thoroughly, no matter what type of plough is employed.

The average depth of ploughing was from three to four inches, the early ploughed land being ploughed deeper than the later. Most of the competitors' aim was to complete this operation as early as possible, the majority commencing in June or July and finishing towards the end of August. The results of an experiment carried out at the Merredin Experiment Farm have shown that early fallowed land returns, on the average, better yields than the late fallowed land. In this experiment, over a period of three years, the June fallowed plots yielded an average of 5 bushels 4 lbs. more per year than those fallowed during the last week in August.

There was also a marked similarity in the methods adopted in connection with the cultivation of the fallow, the object being to conserve the

moisture, destroy weed growth, and consolidate the seed bed. All the competitors, except three, cultivated in September, the Springtyne cultivator being the implement most generally used, but where the land was weedy or had become at all hard, the competitors generally used a skim plough, disc cultivator, or Sundercut. The September cultivation was generally followed by another in October; the fallow was then allowed to remain without further cultivation until March or April, when it was broken up and worked down to a desired firm seed bed. In some cases, however, the fallow was cultivated during summer after rain, advantage being taken to check the weed growth and restore the mulch destroyed by the rains.

VARIETIES.

The most popular variety was "Nabawa" which, with the exception of two in No. 3 Zone, was planted by all the competitors. Of the competitors in the final year "Nabawa" was grown by 17, "Gluyas Early" by 12, "Merredin" by 11, "Federation" by four, "Gresley" by three, "Gluyas Late" and "Baroota Wonder" by two, and "Yandilla King," "Canberra," "Sailor's Fortune," "Toby's Tusk," "Clarendon," "Florence," "S.H.J.," "Carrabin," and "Huff's Imperial" by one each. The varieties favoured by the winners of the Competition were "Nabawa," "Gluyas Early," "Merredin," and "Canberra" in Zone No. 1; "Nabawa," "Gluyas Late," and "Baroota Wonder" in Zone No. 2; and "Federation" and "Gresley" in Zone No. 3.

TIME OF SEEDING.

The period during which the seeding took place ranged from the middle of April to the second week in June, but the major portion of the crops were sown during the month of May, which has been shown to be the optimum time for seeding. However, where the area to be sown does permit of this being done, planting in April with suitable varieties is favoured rather than extending the planting period after May.

RATES OF SEEDING.

The rates of seeding ranged between 40 and 90 lbs. per acre, 45 lbs. being the most popular rate. Of the 19 competitors only one used less than 45 lbs.; six used 45 lbs.; 10 from 45 to 60 lbs.; and two over 60 lbs. The rates were more uniform in No. 1 Zone, which favoured a rate of 45 lbs. per acre, while in No. 2 Zone, as would be expected, there was a greater tendency to use up to a bushel, and in No. 3 Zone the two competitors used 60 and 75 lbs. respectively.

RATES OF SUPERPHOSPHATE.

All the competitors used superphosphate, the rates of application varying between 56 and 130 lbs., while the average rate was 98 lbs. per acre. The minimum rate of application in No. 1 Zone was 90 lbs. per acre, a rate which was favoured by eight competitors, and of these one increased the rate to 1 cwt. and another to 130 lbs. per acre. Of the remaining two competitors one applied 100 lbs. and the other 1 cwt. In Zone No. 2 there was a bigger variation in the rates; two competitors used as low as 56 lbs., but one of these increased this rate up to 112 lbs. on some paddocks. Of the other competitors two used 100 lbs., two 112 lbs.., and one 128 lbs. The applications in Zone No. 3 were 90 and 120 lbs. respectively.

A remarkable instance of the fertility of the land in the Greenough district was noticed on the farm of Messrs. Morrell Bros.; this property has been farmed for over half a century. Last season, with an application of only 56 lbs. of super. per acre, an average yield of 20 bushels 44 lbs. was harvested from 243 acres, while the average yield for the three years was 22 bushels 3 lbs.

The Cup winners in both No. 1 and No. 2 Zones used up to 112 lbs. per acre.

A tendency was noticed to increase the rate of superphosphate on light land. This is desirable because it has a beneficial influence on the resultant crops, and helps to build up the soil by increasing the growth of pasture in the stubble.

TREATMENT OF THE SEED.

No less than 14 of the competitors graded their seed, and four recleaned by means of a harvester, while no information was available concerning the other competitor. This is an indication of the thorough farming methods adopted. Grading is an important operation, which is unfortunately overlooked by many farmers. The care with which the seed was prepared was no doubt responsible for such clean crops as far as admixture was concerned, and the judges were particularly struck with the purity of many of the crops, especially when it is remembered that the whole of the farmers' crops were being inspected.

Only one competitor did not treat his seed for Bunt or Ball Smut. The dry pickling with copper carbonate dust has been adopted by almost all of the competitors, for no less than 14 dry pickled the whole of their seed, and three dry pickled a portion, two of these treating their seed plots only. The wet method, using a "bluestone" solution, was used by one competitor only, and he treated only a portion of his seed. As the result of this seed treatment very little Bunt was noticed in the crops. It is indeed pleasing to see the effort that farmers are making to control this disease. In fact, so efficient is the dry-pickling method, and so much less troublesome than the wet one for treating infected seed, that now-a-days a bunted crop is considered an indication of "slipshod" farming.

DISEASES.

The disease, Flag Smut, was noticed in several of the crops. It is more difficult to control than Ball Smut or Bunt, because the disease is transmitted through soil infection and distributed as a result of the spores on the foliage of the wheat plant being blown about. Fortunately, "Nabawa" is resistant to this disease, and to control this disease it is advisable to plant resistant varieties. As an additional precaution, and particularly when resistant varieties are not available or are unsuitable for the special climatic conditions, the land for the next crop should be fallowed in the early winter months—June and July—and all weed growth which may appear on the fallowed land destroyed either by sheep or by cultivation. It is also advisable, where possible, to grow a crop of oats between the two crops of wheat.

Some crops were also attacked by the disease "Take-all." Unfortunately, no variety as yet is known to be resistant to this disease, and its control, therefore, depends entirely on the farming practice adopted. Suitable methods for the control of "Take-all" are similar to those already recommended for the control of Flag Smut. In addition, planting as late as is

safe in the sowing period is beneficial. Early fallowing and late sowing should, therefore, be the methods adopted to control this disease.

As previously noted, because of the treatment given the seed, the crops were very free from Bunt or Ball Smut. Most of the competitors treated the whole of their seed—this, of course, being the most reliable. Some, however, treated their stud seed plots only, that is to say, that the main crops sown with seed the following year, and with seed produced on these plots, was not treated. This is a perfectly sound and economical practice, and is to be recommended when the treatment of the seed sown in the seed plots is carried out properly and thoroughly.

Septoria was also noticed in some of the very early sown crops. Its presence is considered to be entirely due to the planting of varieties out of season. To prevent its presence in the crop early varieties like "Gluyas Early" should not be sown before the 7th of May in Zone 1 and not before the 14th May in Zone 2.

ROTATIONS.

The stage of development on the farms in the Competition varied from the very old established farms to comparatively "young" farms, in consequence of which it was natural to expect that the rotation of cropping varied considerably. Seven competitors had adopted a rotation extending over four or more years, but generally one consisting of "fallow, wheat crop, oats (planted on stubble), and then pasture." Four competitors practised a three-year rotation, viz., "fallow, wheat and stubble," while six followed a two-year rotation, viz., "fallow and wheat." This can only be taken as a broad view of the farming methods practised, as many of the older established competitors were still developing their properties, and the rotations in different paddocks varied, but the data given refers to the main portion of the cropping. The Cup winners in Zones 1 and 2 both practised a four-year rotation, viz., "fallow, wheat, oats and stubble," and the winner in Zone No. 3 a three-year rotation, viz., "fallow, crop and pasture."

A review of the methods employed by the competitors would not be complete, however, without a reference to the yields obtained. It must be exceedingly gratifying to the donors of the prizes, and also to the Royal Agricultural Society, which has co-operated so whole-heartedly with the Department in conducting the Competition, to note the high average yields which were harvested, and which have been summarised in the table below:—

WHEAT YIELDS COMPETITION.

AVERAGE YIELDS OF ZONES, 1924–1925.

Zone.	No. of Competitors. per acre.	1924.		1925.		1926.		Average Yields.	
		Acreage.	Average yield per acre.	Acreage.	Average yield per acre.	Acreage.	Average yield per acre.	Total acreage.	Average yield per acre.
			B. L.		B. L.		B. L.		B. L.
Zone No. 1 ...	10	4,709	20 58	4,343	15 54	6,864	15 32	15,916	17 15
Zone No. 2 ...	7	1,760	21 9	1,767	22 40	2,185	20 21	5,712	21 19
Zone No. 3 ...	2	...	...	567	16 9	610	10 29	1,177	13 13
	19	6,469	21- 1	6,677	17 43	9,659	16 18	22,805	18 21
Average Yield per acre for whole State	...	...	12 47	...	9 42	...	11 42	...	11 24

During the three years of the Competition the competitors (those who competed for the three years in Zones Nos. 1 and 2, and two years in Zone No. 3) planted 22,805 acres, and their average yield was 18 bushels 4 lbs. per acre, and this was 6 bushels 43 lbs. above the average yield for the State over the same period. The yearly average yields for all the Zones were:—

	bus.	lb.
1924 (Zone 1 and 2 only)	21	1
1925	17	43
1926	16	18

The highest individual yield harvested was that of Mr. T. Richards, of South Caroling, Zone No. 2, who, in 1925, harvested 26 bushels 56 lbs. from 199 acres, with a rainfall of 801 points during the growing period. Messrs. Carter & Sons, of Three Springs, Zone No. 2, gained the highest average yield over the three years with an average of 24 bushels 17 lbs. from a total area of 736 acres. All the final competitors, with the exception of Messrs. Hebiton & Sons, in Zone No. 2, averaged 20 bushels or over. Messrs. Hebiton & Sons had the misfortune, in 1924, to have their crop badly damaged by hail. Their average for the last two years was 19 bushels 54 lbs.

It will be recognised that the prizes are gained not only for the greatest number of bags produced in a restricted, and possibly a specially prepared area, but for the results obtained from the whole of the area stripped for wheat grain. Because of this, and also on account of the essentially practical and commercial conditions surrounding this Competition, it is undoubtedly a very meritorious achievement to win a Championship Cup, and the winner by so doing thereby brings great credit into his district.

Ths Competition is unique in the history of cropping competitions as being the first in Australia to take into consideration the actual yields over the whole farm as determined by merchants' tally dockets, etc. There can be no doubt whatever that this Competition has had a considerable educational value to all thoughtful farmers in this State, and the winners of the Championship Cups are to be congratulated on their well-merited success. A word of praise, too, is due to those winners of the yearly Zone prizes. No less meritorious have been the efforts of those unplaced competitors, who entered so keenly into the spirit of the Competition.

There is distinct evidence that this Competition is bringing about uniformity of methods amongst the competitors, and largely following along the lines of the winners. The other farmers will follow the lead given by the competitors, and their methods must inevitably be improved. The undoubted effect of the Wheat Yields Competition, 1924-26, will be, therefore, to standardise farming practice, and in the direction of better methods and better yields.

In conclusion I would like to express my indebtedness to Mr. G. L. Throssell of this Branch, and my appreciation of the valuable service he has rendered in the compilation of tables, and his general assistance in collating information necessary to this article.

THE EXPERIMENTS WITH THE "CHRISTOFLEAU" ELECTROCULTURE APPARATUS AT THE MERREDIN EXPERIMENT FARM, 1926.

Geo. L. Sutton,
Director of Agriculture.

Early in 1926 a piece of land at the Merredin Experiment Farm was placed at the disposal of Mr. Alex. Trouchet—the vendor—in order that three "Christofleau" electroculture instruments might be installed, with the object of comparing the results obtained from their use with the results obtained on adjacent plots on which the apparatus was not installed.

As with the other experiments the plots were laid down by the Manager (Mr. J. H. Langfield) at right angles to the existing line of fence, which was running approximately East and West, thus providing that the wires attached to each instrument should be placed in a North and South line, as required by the experiment.

In June, shortly after the experiment was planted, and when the crop was well above the ground, Mr. Trouchet inspected the plots and set the instruments with the proper bearing, viz., due North and South. At the same time, at his request, an additional insulator was fixed between the apparatus and the ground, and in addition a tree some distance away from the end of the plots, which he thought might interfere with the results, was removed.

After the results of the experiment were made known, Mr. Wood, a representative of the vendor, visited the farm to replace with a smaller wire the No. 8 gauge wire used on the plots in accordance with the directions received, for it was considered by the vendor that the unsatisfactory results which had been obtained were due to the use of the stouter wire. Mr. Wood also found that the direction of the plots was about 21 degrees West of the magnetic North, *i.e.*, about North-North-West, and not due North and South, as required for the installation of the "Christofleau" electroculture instruments. This is to be greatly regretted for, as the wires were not placed exactly due North and South, the necessary requirements of this experiment were not complied with, and in consequence any comparisons of the results may be questioned.

At the request of Mr. Trouchet arrangements were made for repeating the experiment on the same land during the current season, and in order to remedy the error made in connection with the direction of the wires they were taken up and relaid due North and South in accordance with the bearing taken and given by Mr. Wood with an ordinary compass. After the experiment had been planted for the second time, Mr. P. A. Trouchet, junior, visited the plots and, on checking the bearing of the wires by means of a prismatic compass, found that the wires relaid under the direction of his representative were slightly West of the true magnetic North; the extent of the variation has been found to be 3½ degrees. The experiment has therefore been abandoned and the instruments moved. As Mr. Trouchet desires to reinstal them for next season a piece of land has been made available and will be fallowed for the purpose.

DRAKE, OR DARNEL.

(*Lolium temulentum*, Linn.)

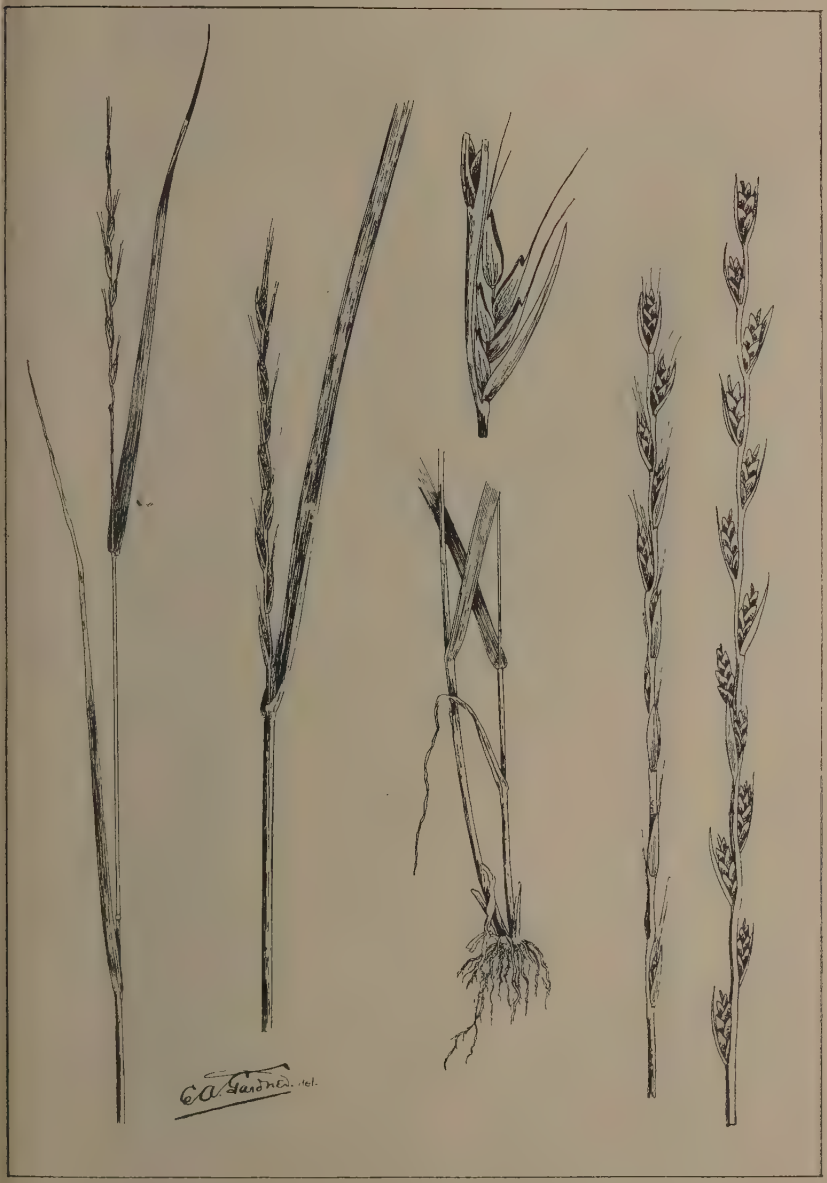
W. M. CARNE, F.L.S., and C. A. GARDNER.

Drake is a common weed in the wheat areas of Australia, particularly in crops, and its association with wheat crops has given rise to the common belief that the grass is a degenerate form of wheat. This is not so, however, the grass being of an entirely different genus—that which contains the well-known Rye grasses. Some authorities consider that the plant is the Tares of the Scripture, which the enemy sowed amongst the wheat. The name *Lolium* is that used by Virgil in mentioning the plant, and *temulentum* has reference to its intoxicating properties. The plant is apparently a good feed, except when in seed; these alone being more or less poisonous. Where, as in the Eastern countries, cereals are harvested by hand, winnowed by tossing in the air, and ground between stones or in simple mills, there is a danger of the Drake seed being ground together with the cereal grains. The Eastern women, therefore, pick out the darnel seeds before grinding. In modern mills they are removed by machinery.

The effect of eating Drake seeds by human beings is to produce narcotic intoxication; the ancients knew of its effect upon the eyesight, and Shakespeare makes a reference to its objectionable character (Henry VI., Act III., Scene 2). Cases of human poisoning are on record, but fatal results seem to be rare. Mr. W. C. Grasby, of the "Western Mail," has recorded a number of cases of Darnel intoxication in Western Australia where settlers have eaten boiled wheat containing Drake. One case recorded by Grasby mentions how a young farmer in this State acquired a habit of eating boiled wheat which was fed to horses. After a time, as the sample deteriorated, the Darnel increased in proportion and eventually produced an intense drowsiness in the man, but apparently had no ill-effect upon the horses. Cases of intoxication amongst pigs are more common. The effects upon animals are only marked after long feeding on hay or grain containing large quantities of Drake seed. The symptoms are drowsiness, uncertain gait, trembling, followed by convulsions, and in some cases death. Drake poisoning, however, is not common, since the ingestion of large quantities for long periods appears to be essential.

The poison is due to a narcotic alkaloid named *temuline*. This alkaloid was long believed to be associated with a fungus which occurs normally in Drake seed. It apparently never produces fruiting bodies, but grows from the seed into the plant and again into the seeds, thus becoming an associate of the normal plant. Dr. Ethel McLennon of Melbourne has shown, however, that what appears to be the same fungus also occurs in *Lolium perenne*, the Perennial Rye Grass, which is considered one of the best pasture plants known, and has never been suspected of being poisonous.

Description of Plant.—A hairless annual grass of two to four feet, stooling at the base. Spike stiff and stout, the spikelets solitary and sessile in the alternate notches with one outer glume as long, or longer, than the flowers. Flowers three to nine, the flowering glumes without awns, or bearded with bristle-like awns. Original home, Europe and Asia. The illustration shows the bearded and beardless forms.



Drake (*Lolium temulentum*, Linn.).

HORTICULTURAL NOTES.

GEO. W. WICKENS,
Superintendent of Horticulture.

SEASONAL WORK FOR OCTOBER, NOVEMBER AND DECEMBER.

October.

Though Apple Scab (*Venturia inequalis*) is unknown in Western Australian orchards, Pear Scab (*Venturia pirina*) is so widespread that scarcely an orchard in the State where pears are grown is free from the fungus, and there is undoubted evidence that the disease is on the increase. Pear growers obtained better prices on the overseas markets in 1927 than for many years past, and the shipments would have been larger had it not been for scab effect rendering a quantity of fruit unfit for export. Individual effort on the part of some growers, as well as tests made by this Department, have shown that the disease can be controlled, and it is strongly advised that all pear growers throughout the State should thoroughly spray their trees during the spring time of this year. The essential time of application is during the pinking stage of blossoming, that is, when the majority of the blooms are showing pink before the petals have opened out. A spray of Bordeaux Mixture comprising 6lbs. bluestone, 4lbs. freshly burned lime and 50 gallons of water, applied at that stage will not infrequently in the climatic conditions usually experienced in Western Australia keep the disease down to negligible proportions, but should damp, humid weather afterwards occur a second spraying when the fruit has set may be necessary. At this latter stage it is advisable to use lime sulphur at a strength of one gallon commercial lime sulphur in 40 gallons of water, because spraying with Bordeaux after the fruit has set often causes russeting. A registered brand of commercial Bordeaux may be used for the first spraying in place of the home-made preparation given above, but in a departmental test, particulars of which were published in the "Journal" issued in June last, the strength advised by the vendors (2lbs. in 7 gallons of water) was found too severe, and it is advisable to weaken the strength to 2lbs. in 10 gallons of water. In the article in the June number mention is made of a test carried out by Mr. Flintoff with lime sulphur applied twice, the second time at spur bursting—that is, just prior to the pinking stage—which gave excellent results. The strength used—1 gallon lime sulphur in 8 gallons of water—is very strong even for spur bursting stage of growth, and will need further testing before it can be stated that it is safe under general conditions, but a test on a few trees in any orchard where lime sulphur is being used to combat San Jose Scale is well worth while and may lead to information which will be most valuable.

Powdery Mildew on apple trees requires attention during spring and early summer and should be treated with Atomic Sulphur, using 1lb. in 10 gallons of water as soon as petals have fallen.

Orange Aphis on citrus trees needs treatment this month, using tobacco wash and soap. A good dressing is made of 1lb. Black Leaf 40 in 80 gallons of water to which 2lbs. of Sunlight soap have been added.

Fruit flies will commence depositing eggs in the early ripening apricots and peaches about the end of this month, and these, as well as loquats and citrus fruits, require attention, using both traps and foliage baiting, and daily destruction of all infested fruits.

The cultivator must be kept in action during October; the first ploughing should have been completed at the end of August and cross-ploughing by the end of September. Where this has been done and cultivation is thoroughly attended to afterwards sufficient moisture will be conserved in the soil to enable the trees to set and carry good crops of fruit, even should the spring and early summer rains be on the light side.

November.

Continue baiting and trapping to control the fruit fly pest, and destroy infested fruit daily.

Pear Slug will make its first appearance about the end of this month. Spray with Arsenate of Lead, using 1¼lbs. Arsenate of Lead powder in 50 gallons of water.

Keep a sharp lookout for traces of Codlin Moth and notify the Department of Agriculture at once if any suspicious tunnellings are noticed in apples or pears. There are only two places in the State—Collie and Narrogin—where the pest is known to be present in Western Australia, and last year's operations were so successful that eradication is confidently expected to follow on this season's treatment; but, just as it appeared in those centres so it may in any others, and the only chance of keeping the State free is to make war against it before it becomes widespread, so all growers in their own interests, and for the good of the whole industry, should be vigilant in observation and spontaneous in action.

Continue cultivation.

Thin out fruits on all trees which have set heavy crops.

December.

Continue the war against fruit fly by foliage baiting and trapping and daily destruction of infested fruit.

Carefully examine apples and pears for traces of Codlin Moth, and notify the Department at once of anything suspicious. Should the pest appear, send a telegram: letters are too slow in a matter of urgency such as this.

Continue cultivation.

Marketing will form the major occupation of growers of stone fruits during this month. Grade to size and quality, making a name for straight dealing, and remember that an honest grower's name on the end of a case is worth shillings in the selling price on the market.

A PRELIMINARY NOTE ON A THEORY AS TO THE ORIGIN OF BITTER PIT IN APPLES.

W. M. Carne, F.L.S.,
Botanist and Plant Pathologist.

In spite of the work of many investigators and especially of McAlpine, no satisfactory explanation of the origin of Bitter Pit has yet been put forward. Certain facts as to the connection between it and cultural methods have been demonstrated, and have generally been adopted by growers. The danger of heavy pruning of susceptible varieties is an instance. None the less Pit continues to occur in our orchards and, what is of more importance, in the export cargoes in the early part of each season. More recently, Smith has brought forward evidence that the development of Pit in overseas shipments may be reduced by later picking and by placing the fruit in cold storage as soon as possible after picking. Smith's conclusions have been verified here by experiments carried out during the past season. These are recorded elsewhere in this *Journal*.

As a result of a study of the results of last season's experiments, and of the data published by Smith, McAlpine and others, a theory has been evolved which appears to meet the facts better than any previously put forward. It is offered tentatively in the hope that it will arouse constructive criticism, and better still, lead to experimental tests of its accuracy.

The theory, which is based mainly on a study of Cleopatra, a very susceptible variety, is as follows:—

Bitter Pit is a necrosis (death of cells) of immature starch-filled tissues of rapidly growing apples, resulting from excessive transpiration, followed by osmotic action between the starch-filled cells and those in which the starch has been largely or completely changed to sugar.

Excessive transpiration on the tree is related mainly to periods of bright sunshine and low humidity. It may or may not be associated with deficiency of soil moisture. It is further related to the size and rapidity of growth of the fruit and to the ability of the tree to maintain sufficient supplies to the fruit to meet the losses of water during periods of high transpiration.

Excessive transpiration in storage is related to the size of the fruit and the fact that it is cut off from receiving supplies of moisture. The difference between cold and ordinary storage is one of relative rates of transpiration and rates of maturation.

Immature tissues are defined as those in which the cells still contain starch.

Bitter Pit does not develop on either mature or ripe fruit. Maturity is defined as the point of development at which the tissue cells do not contain starch. Mature fruits are not ripe (*see* Rothera).

The period of susceptibility extends from an early stage of the fruit development, when sugar commences to appear in some of the cells, to maturity. Susceptibility is greatest when the fruit is growing rapidly and liability is greatest when the susceptible stage is developed during conditions

most conducive to transpiration, *i.e.*, in Australia during January, February, and March.

The difference in susceptibility of varieties is in part due to differences in the rate of fruit growth, and the ability of the tree to supply deficiencies of moisture, and in part due to the critical periods of susceptibility in different varieties being passed under different conditions of temperature and humidity. In other words, a variety, such as Yates, may not be susceptible, owing to its relatively slow growth and efficient vascular tissue in the fruit pedicels, and to the fact that its suspectible period is passed in April and May.

The occurrence of Pit in early shipments of susceptible varieties is due to the picking of the larger terminal apples first, in the idea that they are the first to mature, when they are really amongst the last on a tree if free from Mouldy Core or infection by parasites.

The common occurrence of Pit in the large terminal fruit, or in the large fruits of young trees, or in the large fruits of light crops on old trees, is due to their rapid growth, large transpiring surfaces, late maturity and their early picking.

It is not proposed here to give all the evidence on which the foregoing is based, nor to quote all the authorities which have been consulted. The theory is to be tested out experimentally next season. If it should receive support, it will be elaborated at a later date. It may also be extended to a consideration of Crinkle (Confluent Pit, or Cork), and possibly to Water Core or Glassiness, upon which the theory casts an interesting light. Some points which are either new or have not previously received the attention they deserve, will alone be dealt with.

1. That Bitter Pit originates in store as well as on the trees. This is not generally accepted. McAlpine, himself, first inclined to this idea and then apparently abandoned it on a single inconclusive experiment. In the writer's opinion, the evidence provided by McAlpine himself in Victoria, by Brooks and Fisher in America (quoted by Smith—the authors apparently did not realise the meaning of the results obtained by them), by Smith in Tasmania, and by Wickens and Carne in Western Australia (*see* this *Journal*), is conclusive that Pit does originate in store.

2. That Bitter Pit ceases to develop with approaching maturity, is a matter of personal observation during the course of experiments. It is supported by McAlpine's observations and particularly those of Rothera. The writer knows of no evidence to the contrary.

3. That Pitted tissues contain starch has been shown by McAlpine, Rothera and others. Rothera has shown that starch implies immaturity and that starch and Pit are closely and definitely linked. The ripening of apples (*see* Robbins), we know to be uneven. The tissues within the core line formed by the ten vascular bundles in a transverse section are the first to ripen. Ripening then continues outward between the vascular bundles so that the last areas to ripen are triangular segments with their bases just beneath the skin and their apices at the vascular bundles of the core line. If Pit develops when these segments are wide and the cells containing starch extend to their apices, it may be deep seated. As the ripening areas (cells free from starch) extend outward, Pit, if developed, will be more and more superficial.

4. That the large terminal apples should be amongst, if not the last, of the fruits on a tree to ripen, appears to have been quite overlooked. In a variety such as Cleopatra all setting of fruit takes place within a few days. All fruits start practically at the same time, nevertheless following a law of tree growth, the strongest sap flow is towards the terminal growths. Apples there situated grow more rapidly and attain a larger size than those situated elsewhere. Rapid growth does not in fruit necessarily, if ever, mean rapid maturity. The facts indicate the reverse. The knowledge of the undoubted greater liability of terminal apples to develop Pit than other apples on the same tree, and the known fact that immaturity increases Pit (*see* elsewhere in this *Journal*) alone justifies the conclusion that these large fruit must be when picked the more immature. Other facts support this. Injuries, cincturing (*see* McAlpine), and diseases affecting sap flow, lead to premature maturity. The same effect results from troubles directly affecting the fruit, such as Mouldy Core, Codlin Moth injury, etc. Healthy growth delays maturity. Further, as the last parts of an apple to ripen are those nearest to the centres of sap flow (vascular tissues) so should we expect the fruits nearest the points of maximum sap flow (the terminals of shoots) to be the last to ripen. On young vigorous trees and healthy older trees with light crops the fruit is typically large in consequence of the concentrations of the sap supplies to a limited number of fruit, and the period and degree of susceptibility to Pit is increased accordingly.

5. That the cells containing much starch should suffer whilst those with less or none escape is readily explained. Water loss from the surface of a fruit sets up diffusion currents from the deeper cells until equilibrium is attained. But the osmotic tension of the sugar-containing cells being greater than those charged with starch, those latter can receive no supplies from their more mature neighbours, but must lose water to them. Indeed the final result of the loss of water if not replaced by the vascular tissue from the tree must be that the ultimate loss of water is borne by the starch-filled cells. If this loss is great enough the concentration of the sap in these cells will cause plasmolysis and death as suggested by Wortmann. In the writer's opinion this is the real origin of Pit. In mature apples loss of water is distributed through the tissues and shrinkage occurs; in immature apples the loss is centred in starch-filled areas causing local shrinkage, death and Pitting.

General Conclusions.

If the theory here stated be true, as the writer believes, certain modifications of orchard practice with susceptible varieties should result in the reduction of Pit in stored fruit.

The theory would indicate that:—

1. At thinning time the terminal fruits (centre fruits of clusters) should be removed.

2. The larger the fruit the later it should be picked. Picking should commence on trees with good crops, beginning with the non-terminal fruit. The last pickings should be from the large terminal fruit (if not removed at thinning time) on trees with good crops, all the fruit of young vigorously growing trees, and all the fruit of older trees with light crops, in other words, the fruit most liable to Pit.

3. Picking should be delayed until the fruits approach maturity. The best method of determining maturity has yet to be worked out. It is probable that in the average season the optimum time for picking Cleopatras is about the second week in March.

4. Fruit should go into cold store as soon as possible after picking. This reduces the rate of Pitting, if the apples are picked while still susceptible. If picked in a mature state, over-ripeness is the danger, the liability to which is reduced by immediate cold storage.

References.

McAlpine, D.—Bitter Pit Investigations. First, Second, Third, Fourth and Fifth Reports. Government Printer, Melbourne, 1911-1916.

Smith, A. J. M.—Bitter Pit in Apples. Food Investigations. Special Report No. 28. Department of Scientific and Industrial Research, London, 1926.

Robbins, W. W.—The Botany of Crop Plants. Blakiston, Son & Co., Philadelphia, 1924.

References to Wortmann will be found in McAlpine's First Report, and to Rothera in his Fourth Report.

Mr. E. A. Russell's House, Group 42, Denmark,
Two and a half years after settlement.

AUSTRALIAN TOBACCO INVESTIGATION.

The following statement, dealing with the organisation and activities of the Australian Tobacco Investigation, has been received from the executive committee controlling the investigation on behalf of the Council for Scientific and Industrial Research:—

In August of last year the representative of the British-Australasian Tobacco Company, when giving evidence before the Tariff Board, made an offer on behalf of the company to enter into a definite arrangement with any State Government, or the Federal Government, to spend £ for £ up to a total of £50,000 in developing the tobacco-growing industry in Australia.

The Development and Migration Commission and the Council for Scientific and Industrial Research subsequently discussed this offer with the company, with the result that a definite proposal was submitted by the company which even exceeded the terms of its first offer.

The proposal is, that over a first period of three years, the company will find £20,000 rateably with the sum of £10,000 to be found by the Commonwealth and/or State Governments for the purpose of carrying out investigations and field experiments. Of the £10,000 the Commonwealth Government has agreed to provide £5,000, and it has been suggested that the other £5,000 be found by the Governments of the five mainland States—that is, £1,000 by each of the States for the three-year period.

If, at the expiration of the three-year period, developments are sufficiently encouraging to warrant further effort, and additional expenditure is considered necessary and desirable, the company will provide a further £30,000 conditionally upon the Commonwealth and/or State Governments providing a similar amount, and it is proposed that the five States referred to should contribute £15,000 jointly, or £3,000 each to cover this second period, and the Commonwealth Government the remaining £15,000.

The Commonwealth Government and all the mainland State Governments have formally agreed to the proposals on the terms outlined.

Under the terms of the agreement, an executive committee to control the policy and general direction of this investigation was constituted, and it was agreed that the contributing States should nominate, say, the Directors of Agriculture, or such other officers deemed suitable, to act as an Advisory Committee.

It was a condition of the agreement that the executive committee should consist of a representative of the Development and Migration Commission, a representative of the Executive of the Council for Scientific and Industrial Research, and a third member to be jointly appointed by these two bodies.

The executive now consists of Mr. H. W. Gepp, Chairman of the Development and Migration Commission; Dr. A. C. D. Rivett, Chief Executive Officer of the Council for Scientific and Industrial Research; and Dr. Darnell-Smith, Director of the Botanic Gardens, Sydney, who has had considerable experience on the scientific investigational side of the tobacco industry in Australia. The executive has also appointed as an additional full member of the executive, the Chairman of the Standing Committee on Agri-

culture of the Council for Scientific and Industrial Research who, at the present time, is Dr. S. S. Cameron, Director of the Victorian Department of Agriculture. It may be mentioned that all the State Departments of Agriculture are represented on this standing committee by their permanent heads.

The organisation of the investigation is proceeding as rapidly as possible, and already much work has been done. An economic survey of the present state of the industry is at present being made, and the results of past experiments and experiences in the industry are being closely studied.

The party conducting this survey will visit the various States and interrogate growers; the purpose of the survey, however, is merely to collect information, and not to impart advice. The personnel of this party consists of a man from New South Wales and one from Victoria, together with a graduate in agriculture to undertake a general examination of soils.

It is hoped that as a result of the survey much valuable information will be obtained regarding the economic factors of the industry. A study will also be made of the varieties of leaf grown, and those which have proved most profitable, and information will be sought as to the climatic conditions best suited for their production. The nature of the damage, and the extent of the loss resulting from the ravages of Blue Mould and the methods employed for its prevention, will also be one of the aims of the survey. Information regarding insect pests and the nature of the damage resulting therefrom, and details of the methods employed in the curing, grading, packing, and marketing of the tobacco will also be sought, and the opportunity will be taken during the survey to invite the growers to offer suggestions for the improvement of the industry. The information obtained as a result of this survey—so far as it concerns the individual—will be treated as strictly confidential.

In addition to this economic survey of the industry in Australia, Dr. Darnell-Smith, a member of the executive, is at present in America studying the tobacco industry in that country. His inquiries will have particular reference to the question of soils and cultural methods.

Applications are being called in Australia and throughout the world for the position of Director of Tobacco Investigations. Applicants should have had a thorough University training (or its equivalent) in plant physiology and pathology, with special experience, in some aspects at least, of tobacco growing and curing. It is not expected that any applicant will possess expert knowledge of every phase of the industry; hence the selection of a supporting staff will be deferred until the director has been appointed. The salary offered is from £1,500 to £2,000 per annum (with travelling expenses), according to qualifications. The period of appointment will be three years, and the term may be extended.

It would appear, however, judging from letters received by the executive from growers and from certain published statements, that there is an impression that the purpose of the funds made available under the agreement is to provide some form of subsidy or financial assistance to the industry. The executive wish it to be clearly understood that such is not the case, and that the purpose of the Australian Tobacco Investigation, as its name applies, is to investigate the problems of the industry with a view to their solution, and so to establish the industry in Australia on a sound and stable basis.

It would appear that the first announcement of the agreement gave a decided fillip to the industry, and many inquiries have been received about the possibility of growing tobacco. It is the considered opinion of the executive that, until the proper methods and conditions have been determined, an increase of the area at present devoted to tobacco is inadvisable. A rapid expansion of the industry at present would probably lead to much unsuitable land being devoted to tobacco culture, and to the production of much inferior leaf. Those desirous of obtaining information regarding the industry are advised to communicate with their State Department of Agriculture, who will be kept informed of the executive's researches, and who, in the future as in the past, will continue to be the medium for imparting practical advice to growers.

The executive is anxious that growers will heartily co-operate with it in the inquiries which it will undertake with a view to improving the conditions of the industry. At the same time, the executive will take the obviously practical course of consulting, wherever possible and desirable, the various bodies connected with the industry, and already arrangements have been made to take full advantage of the advice and help which existing State tobacco experts, in view of their long experience, are so qualified to give.

The executive is anxious that the investigation shall be carried out with that unanimity and goodwill on the part of all concerned which characterised the discussions of the contracting parties to the agreement prior to its final acceptance.

SLUGS.

L. J. Newman, F.E.S., Entomologist.

During recent years slugs have increased considerably, and in some South-West areas prove a considerable pest. The peculiar habits of the slug render its extermination a difficult and troublesome matter.

Slugs are in the main nocturnal, coming out of their retreats as the daylight fades, or on very dull days. During the day they hide away under clods of earth, weeds, rubbish or other suitable shelter. It is this night feeding habit which makes their treatment troublesome, as it means night work if we are to successfully cope with them. Most people naturally object to working in the garden or field after dark.

Slugs have considerable powers of increase, and if neglected soon become very numerous and destructive. The eggs, which are glossy, transparent, jelly-like objects, are laid in masses in the soil or under suitable shelter. These hatch in from 16 to 21 days into tiny slugs.

They are very partial to young plants, and will often cut off and destroy same. The mouth of the slug is furnished with a tongue covered with rows of fine teeth-like projections, which act like a file, and by means of which the food is cut off and conveyed into the mouth.

Methods of Control.—First and foremost comes farm sanitation. All weeds and rubbish must be got rid of. Headlands and fence alignments must be kept clean. By the practice of such sanitation a great deal will have been done towards the control of this pest. A dirty farm means encouragement to slugs and other pests.

Trapping.—In any effort made to combat or fight the slug advantage must be taken of any weakness. Knowing that they seek shelter during the day renders it easy to trap them. Pieces of flat wood laid about in their haunts will entice them. Slugs are also very partial to mutton fat. These slats of wood, if greased on the under sides, are rendered doubly attractive. Cabbage leaves so greased and laid about prove very attractive. Sliced pumpkin, if placed about, seems irresistible, the slugs swarming over same. Whatever the trapping mediums used they should be visited regularly at short intervals, and the slugs found destroyed.

Slugs appear to swarm out after a mild rain following a dry spell. This habit should be taken advantage of, and any successful means of control applied.

Experiments have recently been carried out by this office with a view to finding out some more effective dusting medium than lime, soot or tobacco dust. When lime, soot, etc., were used it was found that the slugs, by means of the slime which they exude, were enabled in most instances to crawl away from these irritants. This entailed the use of several dustings before the slugs were killed.

Having read of the success following the use of bluestone in England, it was decided to test this dust under local conditions. The results of the test, also borne out by local growers, has been most encouraging. It was proved that powdered copper sulphate or bluestone used at the rate of 1 lb. to 14 lbs. of lime, dusted on to the bodies of the slugs caused death in every instance. The slugs when once hit by this dust rapidly became paralysed, and would not crawl more than 18 inches after coming in contact with the dust. They were unable to cast off the dust as they did when lime or soot was used. It was so effective that one application was sufficient. This dust has to be applied at night when the slugs are active and exposed. Slugs discovered under slats of wood, etc., can be destroyed by the application of this mixture.

It is not advised to apply the dust to the foliage. The foliage should be raised, and the dust applied to the ground beneath.

If preferred, the bluestone can be applied to the slugs in a spray, using a 3 per cent. solution which is equal to 3 ounces bluestone to $6\frac{1}{4}$ gallons of water, avoiding the foliage.

These treatments are only effective during fine weather.

The way to get cheerful is to smile when you feel bad, to think about somebody else's headache when your own is 'most busin', to keep on believin' the sun is shinin' when the clouds is thick enough to cut. Nothin' helps you to it like thinkin' more 'bout other folks than 'bout yerself.—*A. H. Rice.*

CROWFOOT.

(*Erodium moschatum*, (L) L'Hèr.)

W. M. CARNE, F.L.S., and C. A. GARDNER.

Among the earliest of the natural fodder plants of the South-West are the so-called Wild Geraniums—species of *Erodium*—which are better known under the name of Crowfoot in the English-speaking countries of the Northern hemisphere. Of the four species found in Western Australia, one is native, and is widely distributed through Australia from the South into the warmer regions, the other three being natives of Europe and the Mediterranean region. While the native species is of the most importance in being the largest plant of the four and of widespread occurrence, the one dealt with here is a naturalised plant which is of particular importance in the pastures of the Great Southern districts.

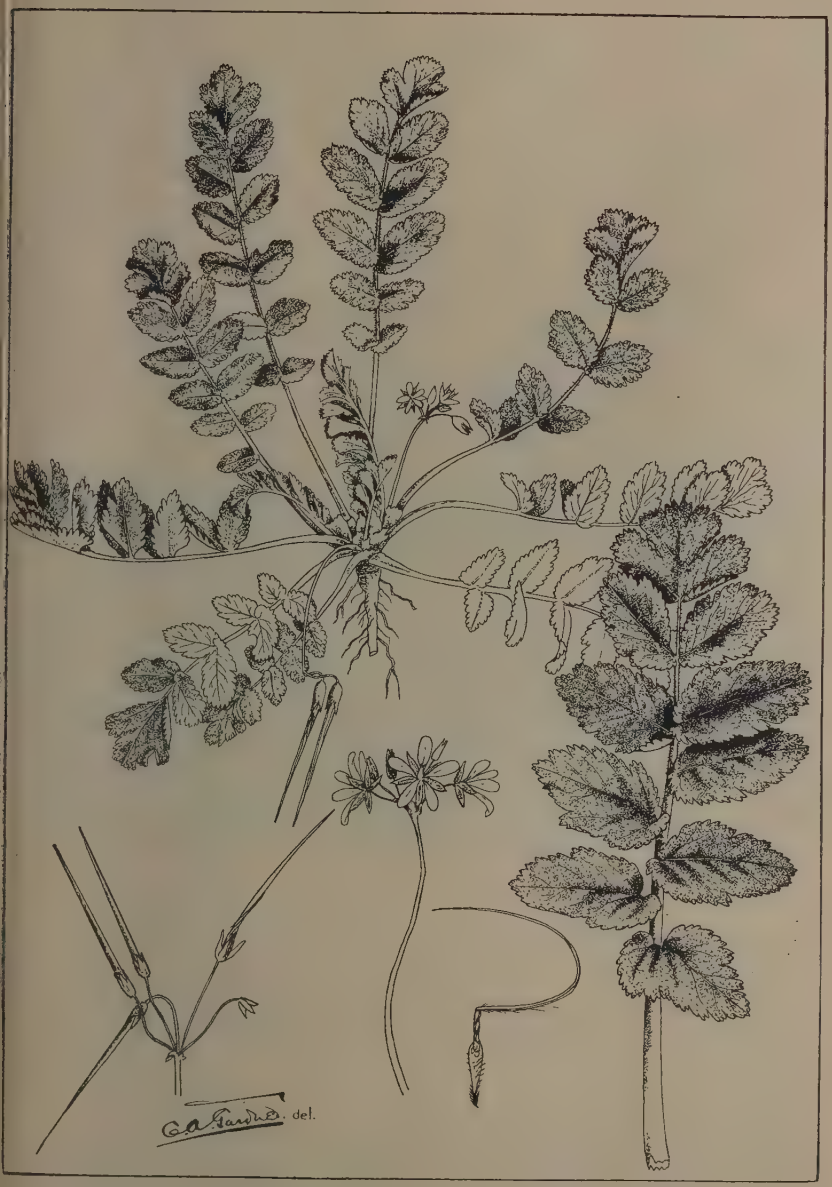
In the central portion of the Great Southern area the herbaceous growth makes but little advancement during the cold wet months of early winter, and the White Gum soils in particular are backward. It is in such places where *Erodium* has become established that its value is of the most importance, and many sheep farmers regard the "wild geraniums" as valuable in constituting the bulk of the early feed. Two of the naturalised species, *E. moschatum* and *E. botrys*, grow closely together in the paddocks with occasional patches of *E. cicutarium* and the native *E. cygnorum*, the last-named being distinguished from the others by reason of its blue flowers.

Sheep generally keep the plants closely grazed, and thus they rarely attain the size of the plants found in waste places. What they lack in size, however, they make up for in density, and it is common to see geranium paddocks in July and August which carry little else than these plants.

A disadvantage of the Crowfoot is the seed, which with its sharp hairy point and watch-spring like awn penetrates deeply into the wool of sheep, and detracts from its value. Early shearing, however, should overcome this difficulty, but even with this fault many farmers prefer the plant because of its usefulness in the cold weather, rather than they would be without it. The seeds usually ripen in October-November.

The awn of the fruit is very hygroscopic, and when the seed has fallen and penetrated the soil if the free end of the awn should catch against some surrounding object and dampness supervenes, the awn untwists and lengthens, and the fruit (seed) is driven into the soil. When dry the awn again curls up and the process may be repeated.

Description of Plant.—A low annual or biennial herb, with a rosette of radical spreading leaves and ascending stems with spreading hairs, many of which are glandular. Leaves pinnatisect, up to seven inches long, oblong in outline, divided to the rhachis into ovate incised-toothed shortly stalked segments; stipules broadly ovate, scarious. Flower in umbels of one to ten on long peduncles; petals pink-purple, rather longer than the sepals which are prominently veined inside. Filaments two-toothed near the base. Ovary five-lobed, beaked, the beak terminating in the style with five short lobes. Carpels separating from the axis, each curling upwards on a long elastic awn usually bearded and sickle-shaped when detached, twisted in the straight stem-like portion.



Crowfoot (*Erodium moschatum* (L.) L'Hèr.).

IRRIGATION.

(PART IV.)

A. R. C. CLIFTON,
Officer in Charge of Irrigation.

APPLYING THE WATER.

After the land has been prepared to take the water, its application requires a knowledge of the conditions, otherwise damage to soil and crops may result. Skill is necessary to avoid puddling or washing of the soil, whilst observation and judgment must be used to decide when the water should be applied and in what quantity. No hard and fast rule can be laid down for applying water any more than it can for applying fertilisers, owing to the varying conditions of soils and sub-soils and the requirements of different crops. The solving of the complex problems in connection with this most important operation of applying water to the land, so that the best results may be obtained, largely depends on the farmer himself. In the past more attention has been given to the engineering phase of the question than the agricultural. The latter presents a wide field for scientific investigation, as fuller knowledge is required for the guidance of the irrigator than is at present available.

It is advisable here, however, to touch on some of the factors which must be taken into consideration.

In the South-West all classes of soils occur, ranging from light sand to heavy clays, and very often a field will comprise two or three different soils. When the water is applied to soils which possess an open or sandy sub-soil, care must be taken to prevent it percolating straight down into the sub-soil by gravity and being lost. Such soils must be flooded or have the furrows close enough to quickly moisten the surface, for under these conditions there will be little lateral spread, as the water will follow the line of least resistance, which in this instance, is downwards.

Shallow soils, with a clay sub-soil, present the other extreme; they should not be flooded and the furrows may be wide apart, as the water will spread laterally quickly by gravity.

In the case of the sandy sub-soil, losses from seepage will be greater, whilst the surface evaporation will be less, and if similar crops are grown, the intervals between waterings will be longer, as in the shallow soils the rooting system will be nearer the surface and the plants will suffer sooner from lack of moisture.

The ideal soil is a rich, fine, well-drained loam, about 4ft. deep, having a clay sub-soil through which the water percolates but slowly. In this class of soil large quantities of water may be applied per irrigation by furrows some distance apart, as it will spread laterally by gravity and rise again between the furrows by capillarity. The intervals between applications will be long and the duty of water high, as evaporation and seepage losses will be low.

It has been proved, however, that all classes of soil respond to irrigation; even the poor sandy soil can be made to produce profitable crops under proper treatment, where water can be applied at a low cost.

Puddling and water-logging of the soil are specially to be avoided, as they cause the roots of plants to suffer for lack of air and serious effects regarding the processes of nitrification and denitrification result. It is impossible to flood newly ploughed land without making it compact, and in cases where the ground has become too dry for germination it should be irrigated before ploughing and planting so as to ensure not only germination, but that the crop will make as much growth as possible before irrigation is necessary, as by then the soil, which will have settled, will be occupied by the roots and protected by the crop from the sun, which all helps to maintain its texture.

Fig. 60a.

Land furrowed out ready for watering.

It is advisable for the water-user to make a study of the history and methods of irrigation. He may get along, but he will be more successful if he studies the science of irrigation in relation to soils, crops, methods, etc., and particularly with reference to his own land for, of course, success in irrigating depends to a large extent, as already stated, on the skill with which it is carried out.

To irrigate crops planted in drills like maize, potatoes, etc., the water is applied to every row or every alternate row, according to the conditions. If the latter course is adopted the furrows should be changed at each irrigation. The irrigating furrows, which are formed with a double-winged horse hoe, or hilling plough, are connected to a head furrow. The latter is made on the headland along the top end of the crop and supplied at intervals of every half chain or so from the ditch.

This simplifies the control of the water and the number of outlet boxes or openings in the channel are reduced to a minimum. Where outlet boxes are not used, it is important to have as few cuts in the channel bank as possible, and these should only be made where the bank is strong. Ditches should never be opened where they have been built up to cross a depression, as the water is bound to get out of control.

Skill and patience are required to regulate the flow equally amongst a number of furrows. Those not receiving enough must be deepened with a shovel, and if sufficient water is not available the number of furrows reduced, whilst those running too fast may be checked by the use of grass, weeds, etc., or the volume reduced by increasing the number of furrows. If drainage tiles are available they will be found very useful in this connection. The inexperienced man will invariably use too large a volume of water and spread it over the land too quickly, whereas it should run clear so that there is no scouring.

When the water has nearly reached the end it should be regulated so that the whole length of the furrow is kept wet, but none is running to waste. In all cases where the water is applied for the first time it is essential to have an experienced man on the job.

In orchard irrigation large furrows are preferable to shallow, narrow ones. An outlet box is required to supply each set of furrows between the rows of trees: flooding of the surface is to be avoided. Watering should always commence from the far end of the ditch, and be worked back to the source of supply.

Where furrow irrigation is practised and until the crop has made sufficient growth to protect the soil, the land must be cultivated, as soon as it is in a fit state, after each irrigation.

LUCERNE UNDER IRRIGATION.

Few crops respond more to irrigation than lucerne, and when it is planted under suitable conditions splendid results can be obtained. (Fig. 60.)

Leaflet No. 147, by the Director of Agriculture, Mr. G. L. Sutton, deals fully with this wonderful fodder plant, and it is only proposed here to give an outline of the methods that have proved successful in growing it under irrigation in the South-West.

As the best time to sow in the heavy rainfall districts is the spring, the grading—which has already been described—must be carried out the preceding summer, and the land left ready for sowing. Sometimes a rape crop is sown and grazed during the winter, but it is preferable to leave the land bare to enable the weeds to be kept down.

In August the area to be planted is given a double ploughing so as to ensure all weeds being destroyed and to prevent interference with the grading. This work must be carefully done with a single furrow plough in such a way that the "strike outs" are on the top of the check banks while the "finish offs" come in the centre of each plot. After three weeks the weeds will have rotted and the land—together with any further weeds that may have germinated—can be ploughed back, gathering the plots to the centre and finishing off alongside the check banks so that no furrows are left. The ploughing is much simplified if a reversible plough is available,

the work being more thorough and there is less liability of damage to the grading, as only one ploughing is necessary.

The plots are then trimmed up with a slicker, which also has the effect of firming the seed bed, and after harrowing, the land is ready for sowing.

Fig. 60. Lucerne under irrigation 28 days from last cutting.

Lucerne requires lime—which should be applied three or four weeks before seeding and fertilising—at the rate of one ton per acre harrowed in after the trimming up. If, however, it is getting late in the season it is preferable to apply the lime either before the first ploughing or leave it

until after the crop is established. On heavy land lime can be applied in the preceding autumn.

It is important to get the lucerne planted as early as possible in September, so as to have a growth of at least 12 inches before it is necessary to irrigate, for though this is one of the hardiest plants when well established, it is very delicate during the primary stages of growth, and flooding the young plants may permanently injure the crop.

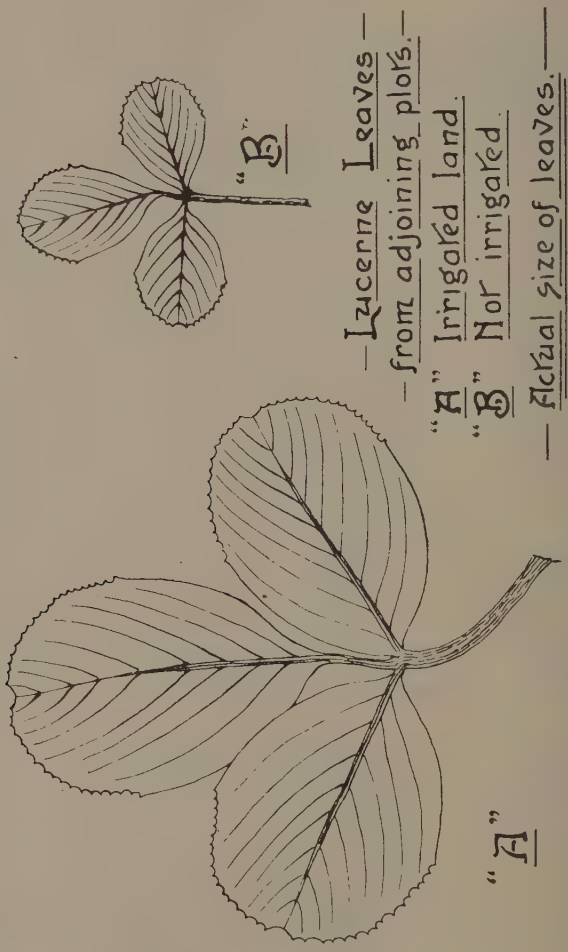


Fig. 61.

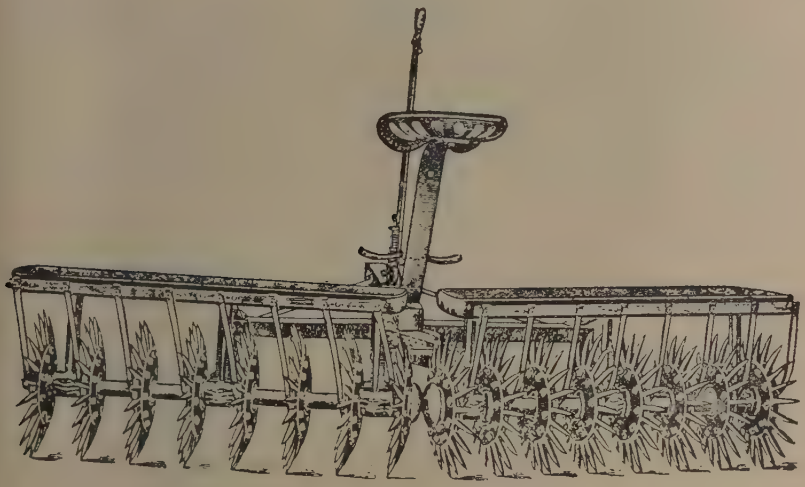
Sowing at the rate of 20-25 lbs. Hunter River seed per acre, with 4 cwt. super. and 1 cwt. dried blood, has given good results.

The seed is usually broadcasted with a "cahoon" seeder, sowing half the quantity of seed one way and then crossing the area at right angles with the balance. This will ensure an even distribution.

After seeding the whole area is rolled at right angles, and across the check banks with a "tee" bar roller. Weeds are one of the main causes of failure, and it is advisable to grow other fodder crops under irrigation for a season before the land is prepared and put down to lucerne. If weeds are bad after the crop is up, cut with a mower and leave them on the ground as a mulch.

A lookout should be kept for dodder, which can be readily detected owing to the sickly yellow colour of the lucerne. If taken in the early stages isolated patches can be easily eradicated by carefully cutting off all affected plants and burning them with straw spread on the spot. If this work is properly done the dodder will be destroyed, and the fire will not cause permanent injury to the lucerne.

Fig. 62.



Rotary Spike Cultivator for Lucerne.

Couch grass, which is widely spread throughout the South-West, has caused serious damage to lucerne plots in that area, and particular care must be taken to have the land free from this grass.

While the amount of water applied and the time of its application must be largely governed by the nature of the soil and the weather conditions, the system of flooding is the universal method used, except for small plots. Under this system of irrigation a uniform distribution of water over the surface to the land is the prime object to be attained; hence the preparation of the land is the first and most important factor in the proper irrigation of lucerne. The better the land is levelled, checked, and supplied with distributing channels, the better the result in spreading the water a uniform depth over the land. He who plants lucerne should remember that the work being done is not temporary, but must stand for several years, and that the time and labour expended in the proper preparation of land is an investment.

The saving of water alone in the amount required for irrigation on land properly graded, etc., will soon repay the expense incurred in thoroughly doing the work, to say nothing of the increased yield of the lucerne as a result of proper irrigation.

To do effectual irrigation the farmer needs a good sized head of water. A very small stream soaks away too fast, and cannot spread over sufficient land. On land which lies well for irrigation an experienced man can handle a flow of from two to three cubic feet per second (equalling 750 to 1.125 gallons per minute).

It is best to water immediately after cutting, and a single copious irrigation of from 3in. to 6in. will supply the needs of the plant until the next crop is taken off, which will be from four to five weeks.

Lucerne is usually cut when the blooms begin to appear, but should there be any sign of the new growth starting it must be cut immediately, otherwise the crop will be spoiled and the new growth damaged.

The chief value of lucerne is in the leaf, and (Fig. 61) shows the vast difference between irrigated and unirrigated lucerne. The illustrations are taken from plants sown on the same day, the conditions being similar except that one was irrigated and the other not. These illustrations are drawn to the same scale.

The cultivation of lucerne will be found very beneficial, both on irrigated and unirrigated land. Fig. 62 shows a Rotary Spike Cultivator—an implement which can be thoroughly recommended.

The following tables show the number of the irrigations and cuttings of a plot of lucerne in the South-West (Figs. 5 and 60) for the first two seasons.

IRRIGATIONS—FIRST SEASON.

No. of Plot.	Date of Sowing.	1st.	2nd.	3rd.	4th.	5th.	6th.
1	Sept. 5	Nov. 11	Dec. 11	Jan. 15	Feb. 13	Mar. 24	
2	„ 5	„ 11	„ 12	„ 13	„ 12	„ 24	...
3	„ 7	„ 14	„ 12	„ 6	„ 11	„ 12	...
4	„ 7	„ 21	„ 11	„ 6	Jan. 26	Feb. 18	Mar. 15
5	„ 10	„ 21	„ 11	„ 4	„ 25	„ 18	„ 15
6	„ 12	„ 19	„ 12	„ 13	„ 30	„ 16	„ 11
7	„ 12	„ 19	„ 14	„ 15	Feb. 17	...	...
8	„ 12	„ 19	„ 14	„ 16	„ 22	Mar. 9	...
9	„ 22	„ 19	„ 18	„ 18	„ 2	Feb. 24	...
10	„ 22	„ 17	„ 26	„ 21	„ 8	Mar. 2	...
11	„ 22	„ 17	„ 26	„ 21	„ 17	...	...
12	„ 22	„ 20	„ 26	„ 18	„ 8	„ 8	...
13	„ 22	„ 20	„ 23	„ 18	„ 4	„ 9	...
14	„ 22	„ 21	„ 14	„ 6	Jan. 29	„ 27	...
15	„ 22	„ 21	„ 18	„ 22	Feb. 17	...	...
16	„ 12	„ 20	„ 17	„ 22	„ 16	...	...

CUTTINGS—FIRST SEASON.

No. of Plot.	Date of Sowing.	1st.	2nd.	3rd.	4th.	5th.	6th.
1	Sept. 5	Dec. 7	Jan. 14	Feb. 13	Mar. 19	Apl. 6	June 16
2	„ 5	„ 8	„ 8	„ 11	„ 17	„ 26	„ 16
3	„ 7	„ 8	„ 7	„ 10	„ 15	„ 24	„ 16
4	„ 7	„ 4	„ 4	„ 8	„ 12	„ 19	„ 15
5	„ 10	„ 1	„ 1	„ 6	„ 10	„ 17	„ 15
6	„ 12	„ 9	„ 12	„ 16	„ 20	„ 28	„ 16
7	„ 12	„ 12	„ 14	„ 18	„ 23	„ 29	„ 16
8	„ 12	„ 12	„ 16	„ 20	„ 25	May 17	„ 29
9	„ 22	„ 16	„ 23	„ 23	Apl. 5	June 14	...
10	„ 22	„ 17	„ 26	„ 26	„ 6	„ 14	...
11	„ 22	„ 19	„ 28	Mar. 5	„ 6	„ 14	...
12	„ 22	„ 17	Feb. 1	„ 6	„ 12	„ 14	...
13	„ 22	„ 22	„ 4	„ 9	„ 12	„ 15	...
14	„ 22	„ 22	Jan. 21	„ 3	„ 14	„ 15	...
15	„ 22	„ 14	„ 18	„ 1	„ 14	„ 15	...
16	„ 12	„ 14	„ 20	Feb. 25	Mar. 27	May 17	June 29

IRRIGATIONS—SECOND SEASON.

No. of Plot.	1st.	2nd.	3rd.	4th.	5th.	6th.
1	Dec. 6	Dec. 31	Jan. 22	Mar. 5	...	...
2	„ 3	„ 31	„ 28	„ 6	Apl. 8	...
3	„ 4	„ 30	Feb. 1	„ 7	„ 8	...
4	„ 3	„ 29	„ 1	„ 7	„ 8	...
5	„ 2	„ 29	Jan. 29	„ 7	„ 9	...
6	„ 6	Jan. 6	„ 28	„ 10	„ 7	...
7	„ 4	„ 3	„ 28	„ 10	„ 7	...
8	„ 2	Dec. 29	„ 26	„ 9	„ 7	...
9	Nov. 26	„ 18	„ 19	Feb. 25	„ 6	...
10	„ 26	„ 18	„ 19	„ 26	„ 6	...
11	„ 26	„ 20	„ 12	„ 26	Mar. 21	Apl. 6
12	„ 26	„ 20	„ 25	„ 26	Apl. 2	...
13	„ 27	„ 20	„ 26	Mar. 2	„ 2	...
14	„ 27	„ 21	„ 26	„ 8	„ 5	...
15	„ 27	„ 26	„ 26	„ 9	„ 5	...
16	Dec. 2	„ 29	„ 26	„ 3	„ 4	...

Fig. 63. Irrigated Maize, furrow system.

CUTTINGS—SECOND SEASON.

Plot No.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.
1 ...	Sept. 17	Nov. 2	Dec. 11	Jan. 15	Feb. 10	Mar. 19	May 2	...
2 ...	„ 17	„ 2	„ 9	„ 8	„ 10	„ 19	„ 2	...
3 ...	„ 17	„ 2	„ 8	„ 6	„ 9	„ 19	„ 2	...
4 ...	„ 14	Oct. 29	„ 4	„ 4	„ 7	„ 14	„ 2	...
5 ...	„ 14	„ 29	„ 4	„ 3	„ 7	„ 14	„ 2	June 18
6 ...	„ 13	„ 27	„ 3	Dec. 30	Jan. 31	Feb. 28	Apl. 20	„ 18
7 ...	„ 13	„ 28	„ 3	„ 29	„ 31	„ 26	„ 28	„ 15
8 ...	„ 29	„ 28	Nov. 27	„ 22	„ 24	„ 26	„ 20	„ 15
9 ...	Aug. 30	„ 12	„ 16	„ 15	„ 17	„ 19	Mar. 29	May 25
10 ...	„ 30	„ 8	„ 16	„ 14	„ 17	„ 19	„ 29	„ 25
11 ...	„ 30	„ 8	„ 16	„ 13	„ 14	„ 17	„ 29	„ 25
12 ...	„ 30	„ 12	„ 23	„ 17	„ 20	„ 21	Apl. 5	June 10
13 ...	Sept. 7	„ 12	„ 23	„ 18	„ 20	„ 21	„ 11	„ 10
14 ...	„ 7	„ 18	„ 24	„ 20	„ 22	„ 23	„ 11	„ 13
15 ...	„ 7	„ 18	„ 24	„ 21	„ 22	„ 23	„ 11	„ 13
16 ...	„ 13	„ 29	„ 27	„ 22	„ 24	„ 25	„ 15	„ 15

MAIZE.

This is another excellent fodder crop which does well under irrigation. It is best sown in drills from 3ft. to 3ft. 6in. apart, and irrigated between. (Figs. 7 and 63.)

The ground must be moist, for if the seed is sown in dry soil and then irrigated much will fail to germinate. The crop can be planted for fodder from October to the beginning of February—small plots planted at intervals will provide continual supplies of green feed during the summer months.

Fig. 64. **Flooding Land for Potatoes.**

POTATOES.

There are few seasons when potatoes would not be benefited by an application of water in the summer. A heavy flooding of the field before planting is advisable (Fig. 64). In some seasons this has been known to mature the crop without a further application.

The art in raising irrigated potatoes is to keep the plant growing vigorously from the time the seed is put into the ground until the crop is matured. Irrigation should be withheld as long as possible, but once started it must be continued at frequent intervals. The moisture content of the soil must be kept as nearly uniform as possible, and light waterings at intervals of 10 days will give the most satisfactory results. It is most important that the plant should not suffer from lack of moisture, for when this happens and water is applied a new growth will be started and only small or misshapen tubers will be dug. Irrigation, apart from increasing the yield, will enable planting to commence earlier, thus if forward seed is used the crop will be on the market ahead of the general summer crop.

USEFUL INFORMATION.

1. A cubic foot of water contains 6.24 British Imperial gallons—approximately 6¼—therefore, 27 cubic feet (or 1 cubic yard) contains 168½ gallons.

2. A cubic foot of water (U.S.A. measure) contains 7½ gallons, and when reading American publications allowance must always be made for this difference.

3. One gallon of water weighs 10 lbs.

4. 2½ feet head of water equals 1 lb. pressure per square inch.

5. One acre of land covered with water to a depth of 1 inch equals 22,650 gallons.

6. The term "acre foot" is the amount of water it takes to cover an acre of land to a depth of 12 inches (271,800 gallons).

7. Doubling the diameter of a pipe increases its capacity four times.

There are people whose delight is to pick locks—to apply the centrebit of their undisciplined intelligence to the discovery of knowledge they have no right to. Concede nothing to such people; their spirit is that of the burglar.—*Bishop Conybeare.*

AUSTRALIAN CLIP STATISTICS.

The following statement, compiled by the National Council of Wool Selling Brokers of Australia, covers the receipts of the 1926-27 clip into store, the total disposals up to the end of July, and the balances in each centre then awaiting sale:—

Selling Centre.	Receipts. Bales.	Disposals Bales.	Bal. in Store. Bales.
Sydney	1,149,589	1,139,650	9,939
Brisbane	318,919	315,313	3,606
Victoria	627,697	624,525	3,172
Adelaide	237,981	235,715	2,266
W. Australia ..	140,520	139,165	1,355
Tasmania	37,142	37,142	—
Totals ..	2,511,848	2,491,510	20,338

The following is a similar statement covering new clip wool (1927-28):—

Selling Centre.	Receipts. Bales.	Disposals Bales.	Bal. in Store. Bales.
Sydney	45,832	3,189	42,643
Brisbane	16,680	116	16,564
Victoria	3,232	488	2,744
Adelaide	15,539	—	15,539
W. Australia ..	5,850	46	5,804
Tasmania	35	16	19
Total ..	87,168	3,855	83,313

And whatever the height you yearn to climb,
Tho' it never was trod by the foot of man,
And no matter how steep—I say you CAN,
If you will be patient—and use your time.

—*E. W. Wilcox.*

FRUIT EXPORT.

GEO. W. WICKENS,
Superintendent of Horticulture.

In the last number of the "Journal," issued in June, particulars were published of the export of fruit from Western Australia covering the period from 1st January to 5th May, 1927. Since then complete returns have been made up showing the number of cases, kinds of fruit and markets to which it was exported during the twelve months from 1st July, 1926, to 30th June, 1927. These are given hereunder and show that a record for the State has been established.

Apple trees represent 53 per cent. of the total area under orchards in Western Australia, and apples figure most prominently in the export returns, for the quantity produced greatly exceeds local requirements and overseas markets are essential. In connection with this year's shipments it is pleasing to know that the quality throughout the season has been uniformly good, and apples from this State have kept their customary place at the top of the price lists in the markets of Great Britain and the continent of Europe.

Export details are as follow:—

No. 1.

EXPORT OF FRESH FRUIT FROM WESTERN AUSTRALIA FOR YEAR ENDING 30TH JUNE, 1927.

Destination.	Apples.	Grapes.	Pears.	Oranges.	Peaches.	Nectarines.	Plums.	Apricots.	Lemons.	Loquats.	Passion Fruit.	Quinces.	Total.
London ...	222,146	14,461	23,249	424	...	...	57	...	...	...	9	28	260,374
Hull	30,952	...	26	10	...	...	...	...	...	...	...	...	30,988
Liverpool ...	3,237	...	...	...	...	...	...	...	...	...	...	...	3,237
Manchester ...	1,090	291	...	...	...	...	...	...	...	...	...	...	1,381
Hamburg ...	141,098	...	2,098	...	...	...	...	...	...	...	...	...	143,196
Southampton	398	...	...	...	...	...	...	...	...	...	...	...	398
Gottenburg ...	1,950	...	...	...	...	...	...	...	...	...	...	...	1,950
Copenhagen ...	2,947	...	...	...	...	...	...	...	...	...	...	...	2,947
Antwerp ...	80	...	...	...	...	...	...	...	...	...	...	...	80
Bremen ...	5,420	...	...	...	...	...	...	...	...	...	...	...	5,420
Norkopping ...	100	...	...	...	...	...	...	...	...	...	...	...	100
Stockholm ...	29,570	...	...	...	...	...	...	...	...	...	...	...	29,570
Colombo ...	9,112	7,306	7	704	...	...	...	...	...	...	...	...	17,129
Madras ...	150	...	...	...	...	...	...	...	...	...	...	...	150
Calcutta ...	150	...	...	...	...	...	...	...	...	...	...	...	150
Bombay ...	647	...	...	...	...	...	...	...	...	...	...	...	647
Otago ...	...	...	...	50	...	...	...	...	50	...	...	...	100
Kalmar ...	50	...	...	...	...	...	...	...	...	...	...	...	50
Malino ...	150	...	...	...	...	...	...	...	...	...	...	...	150
Port Said ...	6,429	206	51	...	...	...	...	...	...	...	...	...	6,686
Batavia ...	4,512	1,285	241½	752½	20	...	74	...	174½	...	...	62	7,059½
Singapore ...	21,683	11,839	229½	2,177½	90	7	210	...	146½	1½	...	...	36,345½
Sourabaya ...	10,164	2,817	303½	165	34	...	71	...	24	...	...	5	13,583½
Samarang ...	55	5	...	10	...	...	...	...	...	...	...	...	70
Durban ...	1,651	...	...	...	...	...	...	...	...	...	...	...	1,651
Alexandria ...	1,000	...	...	...	...	...	...	...	...	...	...	...	1,000
Totals ...	494,641	38,210	26,205½	4,292½	144	7	412	...	395½	1½	9	95	564,412½

In addition to the above during this season 53,560 cases were forwarded to the Eastern States, making a grand total for the year under review of 617,972 cases.

PROFITABLE PIG-RAISING.

"GRADING-UP" AND CROSS-BREEDING.

P. G. HAMPSHIRE,
Superintendent of Dairying.

To make pig-raising fully profitable it is essential that a good marketable class of pig be bred—breed to suit your own market. We have ample demonstration of the want of a definite purpose in breeding pigs in the numbers of poor quality animals that are seen both on the farm and at the bacon factories in Australia generally, and when one considers that the original pigs of Australia were imported (there were no wild pigs)—and naturally one would expect only good types of the various breeds to have been brought to Australia—we have to-day, in a great many cases, a type of mongrel pig that has degenerated very greatly, and it can only be attributed to haphazard mating, neglect in breeding, feeding, and handling. In most instances of poor type it is the result of the crossing of breeds with no defined purpose—mixing them up hopelessly. We had the same thing existing in dairy cattle breeding, in many instances mixing the breeds with each successive generation—utter lack of any object of purpose in breeding—just drift—the nearest or cheapest bull or boar that can be got is used on the cows or sows without any regard for the suitability or weakness of the animals mated, with the result that there is mixed, unsuitable, unprofitable, poor type progeny; a gradual deterioration instead of advance and improvement.

In breeding dairy cows we have their milk and butter production to guide us—in breeding pigs we have the market requirements of shape, size, and meat qualities and economical early maturing at which to aim, and success, advancement, and prosperity will be only obtained by close attention to *breeding and feeding.*

The average pig-raiser cannot at a moment's notice dispose of his mongrel, low-type sows and replace them with the desirable profitable kind. He cannot afford to do so, but he can start on a new forward policy of improving his stock, and the first thing to do, without any doubt, is to secure a pure-bred, well-shaped boar of a breed suitable to mate with the sows. The aim is to remedy the faults of the sows—*in their litters*—to get bigger and better litters—better shapes, better market quality meat, and vigorous healthy economical growers. The boar will do this, but the boar must be pure bred and of good type, and the only guarantee of purity is registration in the Herd Book. Purity is prepotent, because there is a preponderance of one blood. The progeny of a pure-bred boar mated to mongrel sows are stamped with their sire's characteristics. They are better shaped, have better constitutions, are better fleshed, and are better doers. This means higher prices per lb. and cheaper feeders.

The mongrel or cross-bred boars or pure boars of poor type being used are the principal cause of the limited profits in pig-raising, and are prejudicial to the industry. The low-typed mongrel boar is a calamity.

"Grading-up" means using pure males of one breed by a succession of matings, starting with mongrel females and continuing it without deviation

—a concentration of one blood is obtained. The mongrel blood is bred out and a fixed type obtained. To improve on the original low type mongrel pig, select the best type young sows from each generation and mate to pure boars of the breed commenced with—do not change the breed of boar—if you do you start downhill again, and often slide right to the bottom in one step. By a definite policy of "grading-up," such as is suggested, a pig breeder builds up good type and quality, shapely, fast growing and profitable market pigs. His stock are worth looking at and they are money makers, and the man has achieved something to be proud of—he has improved his herd.

"Grading-up" does not require capital—beyond the cost of a good male with which to start. It, however, requires a decision of breed, a steadfastness of purpose, care in mating, handling, and culling, and success is assured.

Cross-breeding means mating pure males of one breed with pure females of another breed. It does not mean mating one cross-bred with another cross-bred, or cross-bred with mongrel, or mongrel with mongrel. In cross-breeding we obtain results that can be depended upon with a considerable degree of reliability for uniformity or similarity of type, but when the crossing is further crossed or criss-crossed the results are most irregular and unreliable. Cross-breeding is often resorted to for the purpose of meeting the market requirements as regards type of meat, size of carcase, and to increase prolificacy. For instance, we have of the different pure breeds the following tendency to weakness:—

Berkshire—Inclined to become over-fat; smallish litters; indifferent mothers.

Tamworth—Slow maturers; unshapely sides and hams; large percentage of bone and offal.

Large Yorkshire—Inclined to over-fat; not suitable for hot climates; large percentage of bone and offal; slow maturers.

Large Black—Inclined to coarseness; slow maturers; large percentage of bone and offal; over-fat.

Poland-China—Inclined to over-fat; small litters.

For various market requirements they rank as follows:—

For Pork—Small Yorkshire, Poland-China, Berkshire, Mid. Yorkshire.

For Bacon—Berkshire, Mid. Yorkshire, Poland-China, Tamworth, Large Black.

As Rustlers (Australian conditions)—Tamworth, Large Black, Berkshire, Yorkshire, Poland-China.

As Graziers (and self-feeders)—Berkshire, Large Black, Yorkshire, Tamworth, Poland-China.

Sty feeders—Poland-China, Mid. Yorkshire, Berkshire, Large Black, Tamworth.

For prolificacy and nursing young—Tamworth, Large Black, Yorkshire, Berkshire, Poland-China.

Early maturing—Berkshire, Poland-China, Yorkshire, Large Black, Tamworth.

Grading-up Board or crossing—Berkshire (stands out in Australia), then Mid. Yorkshire, and Tamworth.

The Ideal Porker (small to medium)—Pure small Yorkshire, Berkshire, Poland-China, Cross-bred Berkshire-Yorkshire, Poland-China-Yorkshire, "Graded-up" Berkshire, Mid. Yorkshire, Poland-China.

Baconers (small to medium)—Pure: Berkshire, Yorkshire, Tamworth. Cross-breds: Berkshire x Berkshire-Tamworth sow, Berkshire x Berkshire-Large Black sow, Berkshire x Yorkshire, "Graded-up" Berkshire, Yorkshire, and Tamworth.

Porkers (large)—Pure Yorkshire, Berkshire. Cross-breds: Berkshire x Mid. Yorkshire, Poland-China x Yorkshire. "Graded-up" Berkshire, Yorkshire, Poland-China, and Large Black.

Baconers (large)—Pure Berkshire, Yorkshire, Large Black, Tamworth. Cross-breds: Berkshire x Berkshire-Tamworth sow, Berkshire x Berkshire-Large Black sow, Berkshire x Yorkshire. "Graded-up" Berkshire, Yorkshire, Tamworth, and Large Black.

In placing the various pure breeds, cross-breds, and grades, an endeavour has been made to advise pig-raisers in regard to all aspects of marketing, climatic conditions, and breeding in order that they may breed a class of pig that is likely to be most suitable, the main considerations of which are quality and percentage of meat, suitability for particular purpose

Twenty Pure-bred Berkshire Baconers sold at Midland Junction Sales, 27/4/27. Average price £3 17s. 6d. Estimated weight 110-120 lbs.

for which the pig is to be killed, blending of fat and lean, shape and size of side, ham, etc., early maturing, hardy, thrifty, prolific, and nursing. In a hot climate like ours, weighty fat sides of bacon are not favoured. Retailers prefer a medium side well streaked with lean.

The writer's experience points unquestionably in the law of averages under West Australian conditions that the pure Berkshire, highly-graded Berkshire, pure Medium Yorkshire prove the best porkers, and for baconers the *Berkshire-Tamworth Comeback*, viz., *Berkshire crossed with Berkshire-Tamworth sow stands pre-eminent*, with pure Berkshire, highly-graded Berkshire in that order. In regard to the Berkshire-Tamworth Comeback it should be bred as follows:—Pure Berkshire boar mated with pure Tamworth

sow (both of good type), and sows selected from this mating and bred back to a Berkshire boar—*the progeny to be marketed*, additional brood sows to be bred Berkshire boar crossed with Tamworth sow. Thus a pig-raiser would start out and procure a pure Berkshire boar and a pure Tamworth sow or sows, and raise his own breeding sows to breed back to a Berkshire boar *unrelated* to the sire of the brood sows. Excellent results (as baconers) have been seen by using a Large Black sow in place of the Tamworth or what is called Berkshire-Large Black Comeback.

It is to be remembered that in the case of the pure Berkshire often too much fat in the bacon, smaller litters, and deficiency in nursing are obtained. In the highly-graded Berkshire much depends upon whether the original females had a percentage of Tamworth or Large Black blood, remembering always that the Tamworth and Large Black impart prolificacy, are excellent mothers, good foragers, have length and depth of sides, and in the case of the Tamworth increased percentage of lean in the rashers.

It will be readily understood that it is most difficult to dogmatise in this direction, and that the results will be varied according to the market requirements, climatic, pasturage, and forced feeding conditions, and types of boars and sows used.

In regard to marketing, pig-raisers in isolated and distant centres are advised to combine together, either in notifying the managers of bacon factories to send buyers or forwarding in truck lots to keep freight costs to a minimum.

Feeding should aim at maximum daily gain in weight—with no dormant growing periods—and the quickest possible transit to market.

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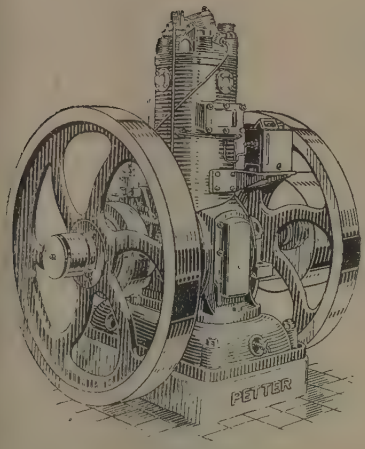

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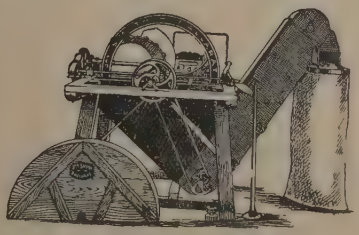


FLOWER, DAVIES, and JOHNSON

413-417 MURRAY STREET, PERTH.

SUDAN GRASS.

(*Andropogon sorghum var.*)

G. K. BARON-HAY, B.Sc.(Agric.),
Assistant Superintendent of Dairying.

Although the introduction of Sudan Grass into Western Australia took place less than nine years ago, its drought-resisting qualities quickly attracted attention, and the plant is now widely known as a summer fodder.

Trial plots were first planted on the Experiment Farms at Merredin and Chapman in 1918, with very promising results. In the same year Mr. J. B. Ding, Brookton, planted a trial plot, and a larger area in 1919, with satisfactory results.

In 1919 no less than 135 farmers were supplied with seed by the Department, the good results from which did much in popularising the plant.

A further factor in making known the possibilities of Sudan Grass was the offer of a prize by Mr. Hector Stewart, M.L.C., of Wagin, for the best five acres of Sudan Grass grown in the Narrogin, Wagin, and Katanning districts in each of the years etc., 1920, 1921, and 1922.

The results of these trials indicated that "though the plant was likely to prove specially suitable for the Southern agricultural areas, it also was likely to fill a useful purpose in parts of the Eastern Wheat Belt, for on Mr. H. H. Paynter's farm, Woolundra, it was found to grow to a height of three feet, with 234 points of rain. No injurious results were experienced when it was fed to stock, and it was found that horses, cows, calves, and pigs relished it."

The complaint is sometimes made that good results cannot be relied upon from this plant, and for this reason the grass is not grown nearly so much as it deserves.

Several factors are essential for the successful cultivation of this grass, and the following notes have been prepared to assist farmers wishing to grow the crop.

Soil and Preparation of Seed Bed.

Sudan Grass has given favourable results on many types of soils, and does not appear to be exacting in this regard. Best results, however, are obtained from rich well-drained loams overlying a clay subsoil. Deep light sandy soils are disappointing, as a rule, unless enriched with a fertiliser containing nitrogen, preferably farmyard manure.

Land intended for Sudan Grass should be fallowed as early as possible in the winter to conserve moisture and kill weeds. The aim should be to produce a firm seed bed covered with 1 to 1½ inches of loose surface soil. This may be produced by cultivation to kill weeds, both after ploughing and prior to seeding.

Rolling the land after cultivation and prior to seeding has given good results, but care should be taken to harrow or cultivate lightly after rolling to loosen the immediate surface.

The importance of a good seed bed cannot be stressed too much, as the plant must rely almost entirely on the conserved moisture for its germination and growth.

Illustration 1.

Growth of Sudan Grass on Fallowed Land, seven weeks after planting, 1925.
J. M. Riegert, Yarloop.

Seed.

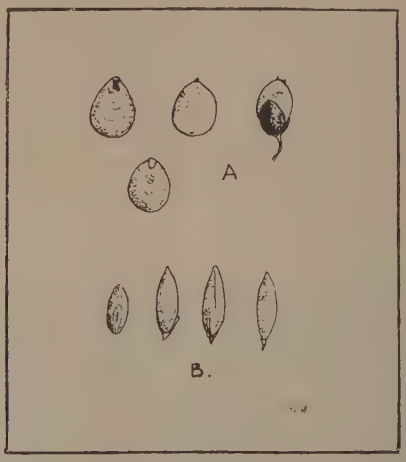
The present price of good seed (5d. per lb., approximately) is an indication of the increase in the cultivation of Sudan Grass. In 1919 seed was quoted from 2s. 6d. to 4s. per lb., and was difficult to procure.

All growers should make certain that their seed supply is pure. Sudan Grass being a sorghum will cross very readily with other members of the family, such as Kaffir Corn or Milo, the poisonous character of which, in the young stages or when stunted, is well known. It probably is due to these hybrid plants among a crop of Sudan Grass that occasional reports are made regarding mortality among stock feeding on this plant. The Chief Veterinary Officer, however, in the September, 1925, issue of this *Journal*, believes that the evidence in each case has been insufficient to warrant condemnation of this variety of valuable fodder as a potential danger.

Seeds of Sorghum are also often found in samples of Sudan Grass, and may be dangerous where the plant is grown for grazing.

Good seed may be ensured by buying from some reputable source of supply and undertaking an examination of the seed for these Sorghum strangers. These may be recognised by their being more or less rounded in shape, whereas Soudan Grass seed is flatter, more elongated, and somewhat pointed at the ends. (See Diagram No. I.)

Diagram I.



A.—Milo Sorghum Seed.
B.—Sudan Grass Seed.

Under the Agricultural Seeds Act, farm seeds are required to be sold with a guarantee of germination and purity. A good sample should have a germination of about 75 per cent., and should not contain more than one per cent. of weed seeds and impurities by weight. By demanding such a guarantee when purchasing seeds, farmers will do much to raise the standard of agricultural seeds.

Rate of Seeding.

Unless care is taken to purchase only seed with a high percentage of germination, disappointing results will ensue in districts where only a light sowing is recommended, and definite advice as to the quantities to sow per acre may be misleading.

The following "real value" of five samples of Sudan Grass seed examined by the Economic Botanist and Plant Pathologist, and reported in the September, 1925, issue of the *Journal*, demonstrates this.

	Purity.	Germination.	Real Value.	Viable seeds in 10lbs. seed.
	Per cent.	Per cent.	Per cent.	lbs.
Sample A	99·4	81·0	81	8·1
„ B	96·8	38·7	38	3·8
„ C	98·8	51·0	50	5·0
„ D	84·8	58·5	50	5·0
„ E	71·2	74·0	53	5·3

Obviously, therefore, in a district where 3 lbs. of seed per acre is recommended, Sample "A" would give a good crop, whereas Sample "B" would undoubtedly prove a failure, other conditions being the same.

Recommendations, therefore, can only be made for samples reaching the standard laid down above.

Competitions have shown that it is preferable to sow light quantities of seed per acre where the annual rainfall is low, *i.e.*, 16 to 17 inches, and to increase the quantity for districts with a higher rainfall.

DISTRICTS WITH ANNUAL RAINFALL.

	17 inches or under.	18–23 inches.	24 inches or over.
Quantity Sudan Grass seed per acre	3lbs.	6lbs.	10lbs.

Illustration 2.

1920. 1919.

Showing the Value of Seed Selection.

Method of Seeding.

Sudan Grass seed may be either broadcasted or sown through a drill.

Broadcasting should not be practised except in districts with an ample rainfall, and the quantity of seed per acre should be increased by one-half over that recommended above.

Unless a broadcasting machine, such as the "Cahoon," or a grass-seeding attachment to the ordinary drill be employed, it is difficult to get an even distribution, which is desirable.

Where hand broadcasting is necessary, a good plan is to mix the seed with a quantity of dry sand or ashes, so that the small quantity of seed per acre may be more easily applied. The usual method, however, is to mix the seed with the fertiliser immediately before seeding, and broadcast the seed with the manure.

Sudan Grass, however, is best sown with the drill, mixing the seed with the fertiliser used, and sowing within twenty-four hours.

Illustration 3.

J. M. Riegert, Yarloop. Sudan Grass in the "Wm. Padbury" competition. Yield 7 tons 18 cwt. per acre.

In dry districts some farmers prefer to close up alternate tubes of the drill so as to sow the seed in drills about 14 inches apart, but good results have been obtained in all districts by sowing through every tube, provided seed is not applied too thickly.

There is considerable difference of opinion among farmers as to the wisdom of mixing Sudan Grass seed with superphosphate prior to seeding. Mr. J. M. Riegert, Yarloop, who annually grows a considerable area for

seed, and won the Royal Agricultural Society's competition this year, always mixes the seed with superphosphate, but has found that it is unwise to leave the seed in the manure for more than 24 hours. Mr. G. C. Hodges, Yornaning, who has also grown Sudan Grass for a number of years, believes that superphosphate has little effect in damaging the seed.

Work carried out to test the effect of superphosphate on certain small seeds has shown that freshly made superphosphate or damp superphosphate is far more dangerous than the dry fertiliser; also that the deleterious effects of superphosphate is not so great on the smaller grass seeds, which are generally covered with a "husk," as on "naked" seeds, such as rape or kale. The writer believes that, by mixing only enough seed with the manure as will be required for the morning or afternoon's sowing, no harmful effects to the seed will be experienced.

Depth of Planting.

With Sudan Grass as with all spring sown crops, care must be taken to see that the seed is planted under the top layer of dry soil and on the moist seed bed. This subject was fully dealt with by the writer in an article on "The Sowing of Small Seeds under Field Conditions" in the September, 1926, issue of this *Journal.*

Where planted with the drill and not followed by a roller, the ordinary depth practised with wheat has given good results. Where rolling is carried out after seeding, the depth may be more shallow, but moisture may be lost by evaporation by this method, which otherwise would be available for the crop.

Manuring.

Sudan Grass is a rapid grower and, therefore, will require supplies of easily available plant food.

By fallowing the land intended for this crop, usually enough soil nitrogen is produced by the process of nitrification to supply the needs of the plant. Trials on a rich loam using 3 cwt. superphosphate, 3 cwt. of a mixture of superphosphate (2 parts) and bonedust (1 part), and 3 cwt. superphosphate plus 40 lbs. nitrate of soda per acre, showed little difference in yield, the bonedust plot being rather slower in coming into head. On loamy soils at least 1 cwt. of superphosphate is recommended, though heavier dressings may be profitably employed where conditions for moisture conservation are good.

Time to Plant.

Sudan Grass will not germinate in a cold, badly aerated soil, and therefore the date of planting in the spring will vary for different districts of the State. It should not be planted until all danger from frost is over, and the ground warm. This will vary from September in the Wheat Belt areas to early November in the extreme South-West portions of the State.

Feeding Sudan Grass.

Sudan Grass may either be utilised as a green crop or fed as hay. It is in the former condition that this crop is of special value in Western Australia.

All the Sorghums, of which Sudan Grass is a member, contains a glucoside capable of yielding prussic acid on fermentation. This glucoside is present in the Sorghums in dangerous quantities up to the time the plant is forming seed. Sudan Grass, however, has not been proved to contain sufficient quantities of this poisonous principle to be dangerous at any time in its growth, and, unless Sorghum or Sorghum-Sudan Grass hybrids are present in the crop, it may be taken as safe for grazing with stock.

Analyses of Sudan Grass in this State have shown the entire absence of this cyanogenetic glucoside, while American analyses have shown that a cow or horse would have to eat 155 lbs. of fresh Sudan Grass in one feed to obtain a lethal dose. This is almost an impossibility. It is a wise precaution, therefore—before turning stock on to Sudan Grass—to walk through the crop

Illustration 4.

(N.S.W. *Journal of Agriculture.*)

A head of Sudan Grass compared with heads of Sorghum and Sorghum-hybrids. On the left—Sudan Grass; Centre—Hybrid plants; on the right—Sorghum.

and note the prevalence of hybrids and Sorghum plants, which may be distinguished by the broad leaves, coarse thick stems, and—if in the head—the short compact heads. Hybrids may show any variation between the true Sorghum heads and the very open heads of true Sudan Grass. If these plants are in any quantity, the crop should not be fed off until the plants are well in head. If only a few undesirable plants are present, they, of course, may be removed. The seed from such a crop should not be reserved for planting purposes the following year.

Sudan Grass compares favourably with Maize by analysis, although, as usually grown in this State, the yield per acre would not be so great.

	Water.	Ash.	Crude Protein.	Carbo-hydrates.		Fat.
				Fibre.	Nitrogen free extract.	
	%	%	%	%	%	%
Sudan Grass ...	63·91	3·4	2·0	8·4	21·5	1·1
Maize	76·9	1·2	1·9	5·5	13·9	0·6

Although a considerable number of feeding trials have been carried out to determine the digestibility of Maize, only a few trials have as yet been carried out with Sudan Grass in this direction. Such trials, however, have indicated that Sudan Grass is relatively very palatable to stock, and has a digestibility of the order of Maize.

To this must be added the undoubted value of the grass as a laxative and tonic during a period of the year when no other green material is usually available. Because of this effect on stock, care should be taken not to turn stock which have been living on dry feed suddenly on to green Sudan Grass. Stock should be accustomed to the change of diet gradually by allowing them to stay on the Sudan Grass only for a short while during the first few days.

Sudan Grass makes excellent hay, and good yields may be secured. Mr. A. G. Paterson, Piesse, obtained over 1 ton per acre in one cutting from about 90 acres, while Mr. J. M. Riegert, Yarloop, reports yields as high as 3 tons of hay per acre in one cutting.

In addition to the hay crop further grazing is obtained, and the feeding value is good, as shown in the following comparison with oaten hay:—

DIGESTIBLE NUTRIENTS PER 100LBS.

	Protein.	Carbo-hydrates.	Fat.
Oaten Hay	3·8	43·7	1·6
Sudan Grass Hay	3·3	53·4	0·9

The cultivation of Sudan Grass offers an opportunity for supplying the luscious feed so necessary to milking stock in the summer, and owes its drought resistance mainly to its power of rapid growth. It has been noticed to head in 55 days, and illustration I. shows a crop well over 5 feet in height only seven weeks from time of planting.

All the events of our life are materials, out of which we make what we will. He who has much spirit should make most of his life.—*Whyte Melville.*

SPRING BEETLE INVESTIGATION.

(Family: *Scarabeidae*; Genus: *Colymbomorpha;* Specific name: *Colymbomorpha Lineata* (Blk.))

L. J. NEWMAN, F.E.S.,
Entomologist.

This group contains a wide range of beetles varying in size, form and habits.

According to their habits, the members of this family can be divided into two well-marked groups—the scavengers and the leaf chafers.

The scavengers, both in the larval and adult stages, feed upon decaying animal and vegetable matter.

The leaf chafers are purely herbivorous insects, which in the adult stage usually feed upon the leaves of trees; but some species, such as the Spring Beetles, devour the pollen, nectary glands, petals of flowers and young fruit. In the larval stage they live in the ground, where they feed upon the roots of grasses and other plants, finally forming an earthen cell, in which they pupate, eventually emerging as the adult beetle.

I have been conducting both field and cage observations of this pest for some years, with a view of determining, if possible, the life history of the Spring Beetle, and also of discovering some effective and cheap destroying agent.

Unfortunately, this insect does not lend itself to life history cage observations. The adults, when placed in cages containing both soil and food plant, in every instance died before egg deposition.

From an examination of the egg-sacs of the female, eggs were revealed, but for some unknown reason the beetle could not be induced to deposit them.

Field observations failed to reveal the eggs, but larvæ and adult beetles were found to be scattered over large areas of the State from Perth Southwards to Albany.

The larvæ are undoubtedly root feeders, but are not found in orchards where clean cultural methods are adopted. The pupæ are found in earthen cells in the ground. Beetles emerge in early spring (mid-September) in the warmer areas and mid-October in the more Southern areas. Many collect in marital swarms, and move about or migrate during bright warm weather.

Weather conditions are a great factor in the control of the pest. Cool, cloudy, showery, spring weather will retard the development of the beetle, and consequently prevent its appearance in plague form.

The life of the adult, under cage and insectory conditions, is from 10 to 16 days. The period of swarming in the field is six weeks. Probable number of eggs is 40 to 60.

Careful observations have been made in the orchard digging and following the plough, with negative results. In no instance has the larval or pupal stage of the Spring Beetle been found in the orchard.

The fact that the orchards are kept carefully tilled and free of living grass roots for a great part of the year, keeps the ground free of the food necessary for the development of the larvæ.

The egg-laying period of the beetle—September, October—corresponds with the ploughing in of all weeds, and the constant cultivation of the orchard throughout the summer would destroy the eggs and render conditions unsuitable for the propagation of the pest.

It has been definitely determined that the beetles swarm from the surrounding country into the orchard, and that it is with the adult stage only that the orchardist has to deal. There is no royal or easy road whereby we can treat this insect, appearing in the orchard as it does as an adult winged beetle.

The damage due to this pest has been increasing during the last few years, largely owing to the cutting out, in the process of clearing, of the natural food plants.

All growers must realise the necessity of co-operative effort and endeavour to destroy as many adults as possible, thus preventing the laying of eggs.

The Department has been, by both laboratory and field tests, endeavouring to discover an effective spray for dealing with this beetle. Under the direction of the Chief Inspector of Orchards a series of trial sprays were made by the District Officer at Bridgetown. These trials gave positive evidence that the beetles could be controlled.

Copies of the formulæ most effective have been forwarded to the horticultural and agricultural societies interested.

The following formulæ were used with good controlling effect:—

(1) Arsenate of lead—1 lb.
Plain flour—½ lb., or molasses—¼ lb.
Water—8 gallons.

The flour mixture gave slightly better results. Mix flour into paste with boiling water.

(2) Paris green—1 oz.
Molasses—2 oz.
Quicklime—½ lb.
Water—10 gallons.

This is a cheap and effective mixture, but must not be used on trees in bloom.

(3) Sunlight soap—11 ozs.
Arsenate of lead—8 ozs.
Water—4 gallons.

This formula combines a contact and internal poison wash. The soap has an immediate effect on the beetles present on the trees, and the poison remains on the foliage for any subsequent invasion. Apply hot.

(4) Sunlight soap—11 ozs.
Water—4 gallons.

This is purely a contact wash, and is not poisonous. Apply hot.

(5) Sunlight soap—11 ozs.
Turpentine—2 tablespoonfuls.
Water—4 gallons.

Apply hot.

A good deal of spray can be saved, when using a straight-out contact wash, by jarring the trees. This will cause the beetles to fall to the ground, where they may be drenched.

The Spring Beetle is present only for a period of about six weeks.

Three good sprayings with any of the recommended mixtures, at intervals of 16 days, should be the maximum required to control this pest.

The fact has to be recognised that this is a annually recurring pest. Its prevalence in plague form largely depends upon seasonal conditions.

HERD TESTING.

PURE BRED COWS—PROFITS OVER COST OF FEEDING—RESULTS OF FOUR YEARS.

P. G. HAMPSHIRE, Superintendent of Dairying.
P. C. COUSINS, Senior Herd Tester.

Following on the policy established in 1924, complete figures are supplied giving particulars of the average cow production of each of the pure-bred herds entered under official test in Western Australia for the year ended 30th June, 1927, together with the value of butter fat, whole milk, skim milk, and the actual cost of feed the cows consume. In addition to the value of the production, if sold as butter fat to the factory—after deducting an allowance of skim milk fed to the calf, and crediting the cow with the balance at 2d. per gallon—is the value of each cow's produce if sold as fresh milk. This latter factor has been provided for in view of the fact that certain stud-masters who are submitting their herds to the official test are producing for sale as fresh milk. The figures given represent the whole of the cows submitted to official test which have completed the nine months' test, and includes all cows which have failed to pass the production standard.

For the purpose of comparison, tables for the years 1924, 1925, and 1926 are included:—

HERDS, IN ORDER OF MERIT, AS PRODUCERS OF BUTTER FAT—YEAR ENDED 30TH JUNE, 1927.

TABLE I.

Columns.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Herd.	Average Fat per Cow for Period of 9 months.	Average Skim Milk per Cow for Period.	Value of Fat for Period, at 1s. 7d. per lb.	Value of Skim Milk for Period, at 2d. per gallon.	Average Value of Fat and Skim Milk per Cow for Period.	Cost of Feed per Cow for Period.	Net Profit per Cow for Period through sale of Fat.	Value of Whole Milk at 1s. 3d. gallon, allowing for rearing calf.	Profit per Cow by sale of Fresh Milk, at 1s. 3d. per gallon.	Cost of Feed per 100 lbs. Fat.	Cost of Feed per gallon of Milk.
	pounds.	gallons.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	Pence.
A. ...	458·52	815	36 6 0	6 15 10	43 1 10	18 2 6	24 19 4	62 6 0	44 3 6	3 19 2	3·93
B. ...	419·05	515	33 3 5	4 5 10	37 9 3	17 17 3	19 12 0	42 15 11	24 18 8	4 5 3	5·55
C. ...	319·17	394	25 5 4	3 5 8	28 11 0	9 3 0	19 8 0	33 19 4	24 16 4	2 17 4	3·44
D. ...	394·30	431	31 4 4	3 11 10	34 16 2	16 7 11	18 8 3	37 7 9	20 19 10	4 3 2	5·79
E. ...	350·75	516	27 15 5	4 6 0	32 1 5	14 8 6	17 12 11	41 18 4	27 9 10	4 2 3	4·48
F. ...	303·48	318½	24 0 6	2 13 1	26 13 7	12 17 11	13 15 8	29 4 5	16 6 6	4 5 1	5·58
G. ...	298·59	409	23 12 9	3 8 2	27 0 11	16 1 6	10 19 5	34 10 4	18 8 10	5 7 10	5·90
H. ...	316·14	295	25 0 6	2 9 2	27 9 8	16 11 11	10 17 9	28 2 4	11 10 5	5 5 0	7·56
I. ...	276·81	411	21 18 3	3 8 6	25 6 9	15 5 9	10 1 0	34 6 3	19 0 6	5 10 4	5·58
J. ...	224·89	229	17 16 1	1 18 2	19 14 3	10 19 3	8 15 0	22 9 1	11 9 10	4 7 5	5·78
K. ...	200·32	245	15 17 2	2 0 10	17 18 0	10 11 6	7 6 6	22 16 0	12 4 6	5 5 9	5·37
L. ...	241·94	156½	19 3 1	1 6 1	20 9 2	14 6 6	6 2 8	19 0 9	4 14 3	5 18 4	9·19
M. ...	259·56	359	20 10 11	2 19 10	23 10 9	19 10 8	4 0 1	30 16 4	11 5 8	7 10 6	7·82
N. ...	205·33	274½	16 5 1	2 5 9	18 10 10	17 15 9	0 15 1	24 13 0	6 17 3	8 13 6	8·45
Averages...	290·72	362	23 0 4	3 0 4	26 0 8	14 10 5	11 10 3	31 10 6	17 0 1	5 0 0	5·79

AVERAGE COSTS OF FEEDS.

Oaten or Wheaten Chaff, £5 per ton; Bran, £8 2s. 6d. per ton; Pollard, £9 15s. per ton; Crushed Oats, 3s. per bushel; Linseed Meal, £13 10s. per ton; Lucerne Pasture, 3s. per week; Lucerne Hay, £7 per ton; Green Maize, 7s. per ton; Silage, 10s. per ton; Brewers' Grains, 6d. per bushel; Pasture, 1s. 6d. per week; Sudan Grass Pasture, 3s. per week or 7s. per ton; Green Lucerne, £2 per ton; Barley, green, 7s. per ton or 3s. per week as pasture.

TABLE I.- HERDS IN ORDER OF MERIT, AS PRODUCERS OF BUTTER-FAT—YEAR ENDED 30TH JUNE, 1926.

Herd.	(1) Average Fat per Cow for period nine months (273 days.)	(2) Average Skim Milk per Cow for period, allowing for rearing calf.	(3) Value of Fat for period at 1/7 per lb. (average price ruling.)	(4) Value of Skim Milk for period at 2d. per gallon.	(5) Average Value of Fat and Skim Milk per Cow for period.	(6) Cost of Feed per Cow for the period.	(7) Profit per Cow for period by sale of Fat.	(8) Value of whole Milk at 1/3 per gallon allowing for rearing calf.	(9) Profit per Cow by sale of Fresh Milk at 1/3 per gallon.	(10) Cost of Feed for 100lbs. of Fat.	(11) Cost of Feed for 1 gallon of Milk.
		gallons.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	d.
A.	527·00	595	41 14 5	4 19 2	46 13 7	19 1 9	27 11 10	48 3 9	29 2 0	3 12 3	5·46
B.	372·00	486	29 9 0	4 1 0	33 10 0	12 4 5	21 5 7	39 17 0	27 12 7	3 5 8	3·66
C.	333·14	367	26 7 6	3 1 1	29 8 7	11 15 3	17 13 4	32 8 11	20 13 8	3 10 7	4·65
D.	290·02	299	22 19 3	2 9 10	25 9 1	10 4 10	15 4 3	27 5 3	17 0 5	3 10 7	4·62
E.	314·10	412	24 17 4	3 8 7	28 5 11	13 8 7	14 17 4	34 8 5	20 19 10	4 3 7	4·75
F.	318·33	353	25 4 0	2 18 10	28 2 10	13 7 7	14 15 3	30 11 10	17 4 3	4 4 0	5·42
G.	267·30	393	21 2 0	3 5 6	24 7 6	14 0 7	10 6 11	28 11 5	14 10 10	5 4 11	5·28
H.	339·97	365	26 18 3	3 0 9	29 19 0	19 13 8	10 5 4	31 13 7	11 19 11	5 15 10	7·61
I.	293·46	417	23 4 7	3 9 6	26 14 1	17 0 2	9 13 11	34 9 11	17 9 9	5 15 11	6·14
J.	234·00	352	18 10 6	2 18 9	21 9 3	15 7 3	6 2 0	29 10 7	14 3 4	6 11 4	6·23
K.	233·44	326	18 9 7	2 14 5	21 4 0	19 9 11	1 14 1	27 18 0	8 8 1	6 4 2	8·32
Averages ...	312·01	393·2	24 14 0	3 5 6	27 19 6	14 14 7	13 4 11	32 5 5	17 10 10	4 14 5	5·66

AVERAGE COST OF FEEDS.

Oaten or Wheaten Chaff, £4 per ton; Bran, £8 5s. 0d. per ton; Pollard, £8 5s. 0d. per ton; Crushed Oats, 3s. per bushel; Linseed, £13 10s. 0d. per ton; Lucerne pasture, 3s. week; Lucerne Hay, £7 per ton; Green Maize, 7s. per ton; Silage, 10s. per ton; Brewer's Grains, 6d. per bushel; Pasture, 1s. 6d. week; Sudan Grass Pasture, 3s. week or 7s. per ton; Green Lucerne, £2 per ton; Maize, 7s. 6d. per bushel.

HERDS, IN ORDER OF MERIT, AS PRODUCERS OF BUTTER FAT, 1925.

TABLE 1.

Columns.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Herd.	Average Fat per Cow for period of 9 months.	Average Skim Milk per Cow for period.	Value of Fat for period at 1s. 5½d. per lb.	Value of Skim Milk for period at 2d. per gallon.	Average Value of Fat and Skim Milk per Cow for period.	Cost of Feed per Cow for period.	Net Profit per Cow for period through sale of Fat.	Value of Whole Milk at 1s. 3d. per gallon allowing for rearing calf.	Profit per Cow by sale of Fresh Milk at 1s. 3d. per gallon.	Cost of Feed per 100lbs. of Fat.	Cost of Feed for 1 gallon of Milk.
	Pounds.	Gallons.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	Pence.
A	439·75	469	32 1 3	3 18 2	35 19 5	14 6 10	21 12 7	35 6 2	20 19 4	3 5 2	5·28
B	354·19	427	25 16 6	3 11 2	29 7 8	11 4 10	18 2 10	31 17 2	20 12 4	3 3 6	4·44
C	335·60	388	24 9 5	3 4 8	27 14 1	11 16 3	15 17 10	29 9 9	17 13 6	3 10 3	5·04
D	380·26	512	27 14 6	4 5 4	31 19 10	16 2 10	15 17 0	36 17 4	20 13 6	4 4 11	5·52
E	326·05	368	23 15 5	3 1 4	26 16 9	11 7 4	15 9 5	28 5 6	16 18 2	3 9 9	4·92
F	323·47	428	23 11 9	3 11 4	27 3 1	14 14 4	12 8 9	31 9 0	16 14 8	4 11 1	5·76
G	312·57	312	22 15 9	2 12 0	25 7 9	14 13 0	10 14 9	25 2 4	10 9 4	4 13 7	7·08
H	277·55	263	20 4 9	2 3 10	22 8 7	12 8 7	10 0 0	21 19 9	9 11 2	4 9 5	6·72
I	208·37	303	15 3 10	2 10 6	17 14 4	8 16 4	8 18 0	22 0 2	13 3 10	4 4 9	4·32
J	297·80	480	21 14 4	4 0 0	25 14 4	17 0 7	8 13 9	34 3 8	17 3 1	5 14 3	6·12
K	357·20	727	26 0 11	6 1 2	32 2 1	24 6 9	7 15 4	48 18 6	24 11 9	6 16 4	6·36
L	252·99	364	18 8 11	3 0 8	21 9 7	13 16 10	7 12 9	26 17 8	13 0 10	5 9 5	6·12
M	270·30	570	19 14 4	4 15 0	24 9. 4	19 17 4	4 12 0	38 16 3	18 18 11	7 7 2	6·36
N	209·86	299	15 6 0	2 9 10	17 15 10	15 9 7	2 6 3	22 11 3	7 1 8	7 7 5	9·72
Averages ...	308·59	407	22 10 0	3 7 10	25 17 10	14 13 2	11 4 8	30 10 5	15 9 5	4 18 1	6·15

AVERAGE COST OF FEEDS.

Oaten or Wheaten Chaff, £4 per ton ; Bran, £8 5s. per ton ; Pollard, £8 5s. per ton ; Crushed Oat , 3s. per bushel ; Linseed, £13 10s. per ton ; Lucerne Pasture, 3s. per week ; Lucerne Hay, £7 per ton ; Green Maize, 7s. per ton ; Silage, 10s. per ton ; Brewer's Grains, 6d. per bushel ; Pasture, 1s. 6d. per week ; Sudan Grass Pasture, 3s. per week or 7s. per ton ; Green Lucerne, £2 per ton ; Maize, 7s. 6d. per bushel.

PARTICULARS OF PRODUCTION, FEED COSTS, AND PROFIT OF HERDS UNDER OFFICIAL TEST.

Year ending 30th June, 1924.

Herd.	Average Fat per cow per Lactation Period (9 mths).	Value of Fat per cow at average price 1923-4, 1s. 7½d. per lb.	Skim Milk per cow after deduction for cream and feeding calf.	Value of Skim Milk at 2d. per gallon.	Total Production Credits.	Cost of Feed per cow for period.	Profit per cow for Lactation period.	Cost of Feed per 100lbs. Fat produced.	Value of 100lbs. Fat at 1s. 7½d. per lb.	Profit per 100lbs. Fat. Less Skim Milk.	Profit per 100lbs. Fat. With Skim Milk.
	lbs.	£ s. d.	gallons.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
"A"	430·32	34 19 3	574	4 15 8	39 14 11	11 17 8	27 17 3	2 15 3	8 2 6	5 7 3	6 9 6
"B"	403·42	32 15 7	453	3 15 6	36 11 1	11 1 6	25 9 7	2 14 11	8 2 6	5 7 7	6 6 3
"C"	382·82	31 2 1	810	6 15 0	37 17 1	20 13 2	17 3 11	5 7 11	8 2 6	2 14 7	4 9 10
"D"	347·29	28 4 4	425	3 10 10	31 15 2	8 5 7	23 9 7	2 7 8	8 2 6	5 14 10	6 15 2
"E"	331·33	26 18 4	519	4 6 6	31 4 10	10 17 9	20 7 1	3 5 9	8 2 6	4 16 9	6 2 10
"F"	292·32	23 15 0	419	3 9 10	27 4 10	8 4 11	18 19 11	2 16 5	8 2 6	5 6 1	6 10 0
"G"	325·90	26 9 6	320	2 13 4	29 2 10	11 16 7	17 6 7	3 12 6	8 2 6	4 10 0	5 6 4
"H"	318·68	25 17 10	358	2 19 8	28 17 6	11 15 5	17 2 1	3 13 10	8 2 6	4 8 8	5 17 4
"I"	267·43	21 14 6	256	2 2 8	23 17 2	5 17 6	17 19 8	2 3 11	8 2 6	5 18 7	6 14 2
"J"	357·53	29 0 11	413	3 8 10	32 9 9	16 7 1	16 2 8	4 11 8	8 2 6	3 11 0	4 10 1
"K"	322·35	26 3 10	550	4 11 8	30 15 6	18 3 5	12 12 1	5 12 9	8 2 6	2 9 9	3 18 2
"L"	335·00	27 4 5	444	3 14 0	30 18 5	13 7 7	17 10 10	3 19 10	8 2 6	4 2 8	5 4 9
"M"	349·92	28 8 7	434	3 12 4	32 0 11	17 17 1	14 3 10	5 2 0	8 2 6	3 0 6	4 1 2
"N"	330·69	26 17 4	432	3 12 0	30 9 4	15 6 8	15 2 8	4 12 11	8 2 6	3 9 7	4 11 1
"O"	302·19	24 11 0	609	5 1 6	29 12 6	12 3 7	17 8 11	4 0 7	8 2 6	4 1 11	5 15 5
"P"	266·79	21 13 6	300	2 10 0	24 3 6	9 16 1	14 7 5	3 13 5	8 2 6	4 9 1	5 7 10
"Q"	249·78	20 5 10	387	3 4 6	23 10 4	11 9 4	12 1 0	4 11 11	8 2 6	3 10 7	4 16 5
"R"	198·34	16 2 4	267	2 4 6	18 6 10	6 13 7	11 13 3	3 7 4	8 2 6	4 15 2	5 17 7
Averages	319·50	25 19 2	362	3 0 4	28 19 6	10 4 10	18 14 8	3 4 1	8 2 6	4 18 5	5 17 3

Number of Lactation Periods (9 months) ... ... 155.

AVERAGE COST OF FEEDS.

Wheat, 4s. 6d. per bushel; Oaten or Wheaten Chaff, £3 10s. per ton; Bran, £8 5s. per ton; Pollard, £8 5s. per ton; Crushed Oats, 3s. per bushel; Linseed, £13 10s. per ton; Lucerne Pasture, 3s. per week; Lucerne Hay, £7 per ton; Maize, green, 7s. per ton; Silage, 10s. per ton; Brewer's Grains, 6d. per bushel; Pasture, 1s. 6d. per week; Sudan Grass Pasture, 3s. per week, or 7s. per ton; Lucerne, green, £2 per ton.

AVERAGES OF ALL COWS UNDER TEST, 1927.

TABLE 2.

1. 602 gallons of milk and 290·72lbs. butter fat per cow.
2. 362 gallons skim milk per cow.

		£	s.	d.
3.	Value of butter fat at 1s. 7d. per lb.	23	0	4
4.	Value of skim milk available for pig feeding	3	0	4
5.	Total credits to cow by sale of butter fat and skim milk ...	26	0	8
6.	Cost of feed for period	14	10	5
7.	Profit through sale of fat after deducting feed costs	12	6	8
8.	Value of whole milk if sold at 1s. 3d. per gallon	31	10	6
9.	Profit by sale of fresh milk at 1s. 3d. per gallon after deducting cost of feed	17	0	1
10.	Average cost of feed per 100lbs. fat produced	5	0	0
11.	Average cost of feed per gallon of milk produced	0	0	5·79

AVERAGES OF ALL COWS UNDER TEST—1926.

TABLE 2.

1. 624 gallons Milk and 312·011bs. Butter Fat per Cow.
2. 393·2 gallons skim Milk per Cow.

		£	s.	d.
3.	Value of butter fat at 1s. 7d. per lb.	24	14	0
4.	Value of skim milk available for Pig feeding	3	5	6
5.	Total credits to cow by sale of butter fat and skim milk ...	27	19	6
6.	Cost of feed for period	14	14	7
7.	Profit through sale of fat after deducting feed cost	13	4	11
8.	Value of whole milk if sold at 1s. 3d. per gallon	32	5	5
9.	Profit by sale of fresh milk at 1s. 3d. per gallon after deducting cost of feed	17	10	10
10.	Average cost of feed per 100lbs. fat produced	4	14	5
11.	Average cost of feed per gallon of milk produced	0	0	5·66

AVERAGES OF ALL COWS UNDER TEST—1925.

TABLE 2.

1. 652 gallons of milk and 308·59lbs. butter fat per cow.
2. 407 gallons of skim milk per cow.

		£	s.	d.	
3.	Value of butter fat at 1s. 5½d. per lb.	22	10	0	per cow.
4.	Value of skim milk available for pig-feeding ...	3	7	10	,,
5.	Total credits to cow for sale of butter fat and skim milk	25	17	10	,,
6.	Cost of feed for period	14	13	2	,,
7.	Profit through sale of fat, after deducting feed costs ...	11	4	8	,,
8.	Value of whole milk if sold at 1s. 3d. per gallon ...	30	10	5	,,
9.	Profit by sale of fresh milk at 1s. 3d. per gallon after deducting cost of feed	15	9	5	,,
10.	Average cost of feed per 100lbs. fat produced ...	4	18	1	,,
11.	Average cost of feed per 1 gallon of milk produced ...	6·15d.			per gallon.

HERDS, IN ORDER OF MERIT, AS PRODUCERS OF MILK, 1927.

TABLE 3.

Herd.	Milk, Average Gallons.	Fat, Average Pounds.	Cost of Feed per Cow.	Profit as Milk.	Profit as Fat.	Cost to produce 100 lbs. Fat.	Cost to produce 1 gallon Milk.
			£ s. d.	£ s. d.	£ s. d.	£ s. d.	Pence.
A. ...	1,106	458·42	18 2 6	44 3 6	24 19 4	3 19 6	3·93
E. ...	773	350·75	14 8 6	27 9 10	17 12 11	4 2 3	4·48
B. ...	772	419·05	17 17 3	24 18 8	19 12 0	4 5 3	5·55
C. ...	638	319·17	9 3 0	24 16 11	19 8 0	2 17 4	3·44
D. ...	679	394·30	16 7 11	20 19 10	18 8 3	4 3 2	5·79
I. ...	657	276·81	15 5 9	19 0 6	10 1 0	5 10 4	5·58
G. ...	654	298·59	16 1 6	18 8 10	10 19 5	5 7 10	5·90
P. ...	554	303·48	12 17 11	16 6 6	13 15 8	4 5 1	5·58
K. ...	472	200·32	10 11 6	12 4 6	7 6 6	5 5 9	5·37
H. ...	527	316·14	16 11 11	11 10 5	10 17 9	5 5 0	7·56
J. ...	455	224·89	10 19 3	11 9 10	8 15 0	4 7 5	5 79
M. ...	599	259·56	19 10 8	11 5 8	4 0 1	7 10 6	7·82
N. ...	505	205·33	17 15 9	6 17 3	0 15 1	8 13 6	8·45
L. ...	374	241·94	14 6 6	4 14 3	6 2 8	5 18 4	9·19
	602	290·72	14 10 5	17 0 1	11 10 3	5 0 0	5·79

Guernsey Bull, WOLLONGBAR KING, 535.

Sire—Rose Chief of Wollongbar; two occasions Champion Guernsey Bull, Sydney Royal Show; 1st Prize Bull and Progeny, Sydney Royal Show 1921, 1922, and 1923.

Dam—Gladness of Wollongbar, 452. Production 10,020 lbs. milk, 626 lbs. butter, 365 days.

S. Bastiani, Group 42, Denmark.

TABLE 3.—HERDS, IN ORDER OF MERIT, AS PRODUCERS OF MILK—YEAR ENDING 30TH JUNE, 1926.

Herd.	Milk, Average Gallons.	Fat, Average Pounds.	Cost of Feed per Cow.	Profit as Milk.	Profit as Fat.	Cost to produce 100lbs. of Fat.	Cost to produce 1 gallon of Milk.
			£ s. d.	£ s. d.	£ s. d.	£ s. d.	pence.
A.	861	527·00	19 1 9	29 2 0	27 11 10	3 12 3	5·46
B.	740	372·00	12 4 5	27 12 7	21 5 7	3 5 8	3·66
E.	658	314·10	13 8 7	20 19 10	14 17 4	4 3 7	4·75
C.	608	333·14	11 15 3	20 13 8	17 13 4	3 10 7	4·65
I.	663	293·46	17 0 2	17 9 9	9 13 11	5 15 11	6·14
F.	592	318·33	13 7 7	17 4 3	14 15 3	4 4 0	5·42
D.	532	290·02	10 4 10	17 0 5	15 4 3	3 10 7	6·62
G.	637	267·30	14 0 7	14 10 10	10 6 11	5 4 11	5·28
J.	591	234·00	15 7 3	14 3 4	6 2 0	6 11 4	6·23
H.	605	339·97	19 13 8	11 19 11	10 5 4	5 15 10	7·61
K.	562	233·44	19 9 11	8 8 1	1 14 1	6 4 2	8·32
Average	624	312·01	15 1 4	17 6 6	13 4 11	4 14 5	5·66

Average Cost of Feeds (see Table I.)

HERDS, IN ORDER OF MERIT, AS PRODUCERS OF MILK—1925.

TABLE 3.

Herd.	Milk. Average Gallons.	Fat. Average Pounds.	Cost of Feed per Cow.	Profit, as Milk.	Profit, as Fat.	Cost to produce 100lbs. Fat.	Cost to produce 1 gallon Milk.
			£ s. d.	£ s. d.	£ s. d.	£ s. d.	Pence.
K	1,007 (1)	357·20	24 6 9	24 11 9	7 15 4	6 16 4	6·36
A	721 (5)	439·75	14 6 10	20 19 4	21 12 7	3 5 2	5·28
D	768 (3)	380·26	16 2 10	20 13 6	15 17 0	4 4 11	5·52
B	674 (7)	354·19	11 4 10	20 12 4	18 2 10	3 3 6	4·44
M	833 (2)	270·30	19 17 4	18 18 11	4 12 0	7 7 2	6·36
C	631 (8)	335·60	11 16 3	17 13 6	15 17 10	3 10 3	5·04
J	733 (4)	297·80	17 0 7	17 3 1	8 13 9	5 14 3	6·12
E	608 (9)	326·05	11 7 4	16 18 2	15 9 5	3 9 9	4·92
F	675 (6)	323·47	14 14 4	16 14 8	12 8 9	4 11 1	5·76
I	536 (12)	208·37	8 16 4	13 3 10	8 18 0	4 4 9	4·32
L	604 (10)	252·99	13 16 10	13 0 10	7 12 9	5 9 5	6·12
G	546 (11)	312·57	14 13 0	10 9 4	10 14 9	4 13 7	7·08
H	492 (14)	277·55	12 8 7	9 11 2	10 0 0	4 9 5	6·72
N	532 (13)	209·86	15 9 7	7 1 8	2 6 3	7 7 5	9·72
Averages	652	308·59	14 13 2	15 9 5	11 4 8	4 18 1	6·15

HERDS, IN ORDER OF MERIT, SHOWING COST OF FEED PER 100LBS. FAT—1927.

TABLE 4.

Herd.	Cost of Feed per 100lbs. Fat.	Under Average.	Over Average.
	£ s. d.	£ s. d.	£ s. d.
C	2 17 4	3 2 8	...
A	3 19 2	1 0 10	...
E	4 2 3	0 17 9	...
D	4 3 2	0 16 10	...
F	4 5 1	0 14 11	...
B	4 5 3	0 14 9	...
J	4 7 5	0 12 7	...
H	5 5 0	...	0 5 0
K	5 5 9	...	0 5 9
G	5 7 10	...	0 7 10
I	5 10 4	...	0 10 4
L	5 18 4	...	0 18 4
M	7 10 6	...	2 10 6
N	8 13 6	...	3 13 6

Average of all Herds—£5.

HERDS, IN ORDER OF MERIT, SHOWING COST OF FEED PER 100LBS. FAT—1926.

TABLE 4.

Herd.	Cost of Feed per 100lbs. Fat.	Under Average.	Over Average.
	£ s. d.	£ s. d.	£ s. d.
B	3 5 8	1 8 9	...
C	3 10 7	1 3 10	...
D	3 10 7	1 3 10	...
A	3 12 3	1 2 2	...
E	4 3 7	0 10 10	...
F	4 4 0	0 10 5	...
G	5 4 11	...	0 10 6
H	5 15 10	...	1 1 5
I	5 15 11	...	1 1 6
K	6 4 2	...	1 9 9
J	6 11 4	...	1 16 11

Average of all Herds—£4 14s. 5d.

HERDS, IN ORDER OF MERIT, SHOWING COST OF FEED PER 100LBS. FAT—1925.

TABLE 4.

Herd.	Cost of Feed for 100lbs. Fat.	Under Average.	Over Average.
	£ s. d.	£ s. d.	£ s. d.
B	3 3 6	1 14 7	...
A	3 5 2	1 12 11	...
E	3 9 9	1 8 4	...
C	3 10 3	1 7 10	...
I	4 4 9	0 13 4	...
D	4 4 11	0 13 2	...
H	4 9 5	0 8 8	...
F	4 11 1	0 7 0	...
G	4 13 7	0 4 6	...
L	5 9 5	...	0 11 4
J	5 14 3	...	0 16 2
K	6 16 4	...	1 18 3
M	7 7 2	...	2 9 1
N	7 7 5	...	2 9 4

Average of all Herds ... ... £4 18s. 1d.

HERDS, IN ORDER OF MERIT, SHOWING COST OF FEED PER GALLON OF MILK PRODUCED—1927.

TABLE 5.

Herd.	Cost of Feed per gallon Milk.	Under Average.	Over Average.
	Pence.	Pence.	Pence.
C	3·44	2·35	...
A	3·93	1·86	...
E	4·48	1·31	...
K	5·37	·42	...
B	5·55	·24	...
P	5·58	·21	...
I	5·58	·21	...
J	5·78	·01	...
D	5·79	...	...
G	5·90	...	·11
H	7·56	...	1·17
M	7·82	...	2·03
N	8·45	...	2·66
L	9·19	...	3·40

Average of all Herd—5·79d.

HERDS, IN ORDER OF MERIT, SHOWING COST OF FEED PER GALLON OF MILK PRODUCED—1926.

TABLE 5.

Herd.	Cost of Feed per gallon of Milk.	Under Average.	Over Average.
	Pence.	Pence.	Pence.
B	3·66	2·00	...
D	4·65	1·01	...
C	4·75	·91	...
H	5·28	·38	...
F	5·42	·24	...
A	5·46	·20	...
E	6·14	...	·48
I	6·23	...	·57
G	6·62	...	·96
J	7·61	...	1·95
K	8·32	...	2·66

Average of all Herds—5·66d.

HERDS, IN ORDER OF MERIT, SHOWING COST OF FEED PER GALLON OF MILK PRODUCED—1925.

TABLE 5.

Herd.	Cost of Feed per gallon of Milk.	Under Average.	Over Average.
	Pence.		
I	4·32	1·83	...
B	4·44	1·71	...
E	4·92	1·23	...
C	5·04	1·11	...
A	5·28	·87	...
D	5·52	·63	...
F	5·76	·39	...
L	6·12	·03	...
J	6·12	·03	...
M	6·36	...	·21
K	6·36	...	·21
H	6·72	...	·57
G	7·08	...	·93
N	9·72	...	3·57

Average of all Herds ... ... 6·15d.

HERD TESTING.

THE OFFICIAL AUSTRALIAN PURE BRED DAIRY CATTLE PRODUCTION SCHEME.

Conducted by Dairy Branch, Department of Agriculture—Year ending 30th June, 1927.

Name of Cow.	Owner.	Breed.	Herd Book No.	Age.	Date of Calving.	No. of Days in Test.	Weight of Milk for Period.	Average Test.	Total Butter Fat.	Weight of Milk Last day of Test.	Sire.
MATURE COWS—STANDARD 350 LBS. BUTTER FAT.											
				Yrs. Mths.			lbs.	%	lbs.	lbs.	
Milton's Daisy 2nd	A. W. Padbury ...	Guernsey...	922	5 1	7-8-26	273	9,367	5·16	484·17	22½	Wickham Goldraiser, 214.
Mokine Malmaison	Walker & Co. ...	Jersey ...	11724	6 0	12-8-26	273	6,550	7·05	461·88	13½	Mokine Chrisopher Columbus, 1999.
Mokine Empire Lily 5th ...	T. H. Wilding ...	do. ...	10635	6 2	28-9-26	273	7,132	6·41	457·23	12½	Noble's Best of Garden Hill, 1756.
Carnation of Dardanup... ...	R. H. Rose ...	do. ...	9995	9 0	8-9-26	273	8,425	5·39	454·77	18½	Carnations Masterpiece of Garden Hill, 2065.
Belvedere 6th of Dardanup ...	Walker & Co. ...	do. ...	8454	8 5	4-4-26	273	7,643	5·56	417·01	22½	Carnation's Masterpiece of Garden Hill, 2065.
Velvet of Wollongbar	Dept. of Agriculture (Denmark)	Guernsey...	774	5 5	20-10-25	273	8,956	4·55	407·59	7	Faithful Fido of Wollongbar, 81.
Lady Fowler 6th of Dardanup ...	R. H. Rose ...	Jersey ...	10005	8 8	14-6-26	273	7,212	5·40	389·62	14	Carnation's Masterpiece of Garden Hill, 2065.
Tipperary Mona	W. G. Burges ...	Ayrshire ...	6165	7 5	18-8-26	273	7,794	4·89	381·83	13	Loudon of Oakbank, 2553.
Milton's Rosebud	A. W. Padbury ...	Guernsey...	500	7 4	30-4-26	273	7,388	4·82	356·30	14½	Golden Dream, imp., 18.
Virginia of Nundorah	Dept. of Agriculture (Denmark)	do. ...	778	5 11	21-9-26	273	6,946	4·90	340·40	15½	Warrior of Nundorah, 322.
Dairymaid 6th of Gleneira ...	W. G. Burges ...	Ayrshire ...	8513	6 0	20-7-26	273	6,628	4·25	282·25	4½	Acme of Gleneira, 3801.
Oakford Honor	H. G. Walton ...	Red Poll...	1136AA	9 7	21-6-26	273	5,810	4·5	261·44	12	Honningham Ammerdown, 47AA.
Della 11th of Oakdale	H. O. Timms ...	M.S. ...	9355	aged	26-2-26	273	5,907	4·42	260·88	19	Courage of Oakdale, 325.
Vanity 8th of Oakdale ...	do.	do. ...	12931	6 3	14-3-26	240	5,865	4·22	256·02	11	Standard of Oakdale, 226.
Honey of Blackheath	do.	do. ...	11766	5 8	22-6-26	240	5,805	3·97	230·91	8½	Flower's Mayfield of Blackheath, 370
Thelma of Blackheath	do.	do. ...	12847	5 5	11-2-26	240	5,370	4·19	225·22	9	Flower's Mayfield of Blackheath, 370
*Gladness of Wollongbar ...	Dept. of Agriculture (Denmark)	Guernsey...	452	8 3	3-8-26	180	4,020	5·32	214·14	19	George 3rd, 15
*Yarraview Bonnie Annie ...	A. W. Padbury ...	do. ...	564	9 0	2-7-26	90	3,585	6·48	232·59	38½	Yarraview Golden Cherub, 3147 E.G.H.B.
COWS OVER 4½ YEARS AND UNDER 5 YEARS—STANDARD 325 LB. BUTTER FAT.											
Milton's Dulcie 2nd	do.	do. ...	928	4 9	25-5-26	273	9,894	5·19	513·52	23	Langwater Illustrious, imp., 269
Daisy 2nd of Garden Hill ...	Walker & Co. ...	Jersey ...	10629	4 9	5-12-25	273	8,235	5·49	452·61	20	Macaw of Banyule, 1754
Colleen of Rosewood	Dept. of Agriculture (Denmark)	Guernsey...	819	4 6	2-8-26	273	8,160	5·29	431·67	20	Archer of Nundorah, 76
Gladness 2nd of Wollongbar ...	do.	do. ...	631	4 7	26-1-26	273	5,430	5·80	314·82	10	Faithful Fido of Wollongbar, 81
Noraleda 2nd of Roelands ...	R. H. Rose ...	Jersey ...	14337	4 7	24-9-26	60	2,505	4·71	118·05	41	Makarini, 995

* Died before completion of Test.

COWS OVER 4 YEARS AND UNDER 4½ YEARS—STANDARD 300 LBS. BUTTER FAT.

Morden Lady II. of Koojan ...	A. W. Padbury ...	Guernsey...	918	4	1	21-9-26	273	7,378	5·56	410·80	19½	Gay Lad's Golden Dawn of Guildford, 162
Nymphia of Juadine	Walker & Co. ...	Jersey ...	12,081	4	2	12-7-26	273	6,384	6·06	387·22	18½	Nobles Best of Garden Hill, 1756
Makanora of Grass Vale ...	R. H. Rose ...	do. ...	12,257	4	1	7-7-26	273	6,897	5·0	345·11	14	Makarini, 995
Countess 6th of Berry	R. Smith	M.S. ...	13,347	4	3	10-6-26	240	7,545	4·28	322·95	31	Melba's Emblem of Darbalara, 461
Gibson Girl 9th of Berry ...	do.	do. ...	13,720	4	2	6-11-26	180	6,960	4·38	304·89	28½	Melba's Emblem of Darbalara 461
Primula 2nd of Berry	do.	do. ...	14,434	4	4	12-10-26	210	6,720	4·41	296·94	20	Rutland of Darbalara 475
Blue Bell 2nd of Cowra ...	do.	do. ...	13,614	4	2	29-5-26	210	6,255	4·53	283·77	23	Newhaven of Darbalara, 1174
The Flower of Telyarup ...	H. O. Timms ...	do. ...	14,747	4	4	31-8-26	240	6,015	4·35	262·20	8½	Earl of Blackheath, 947

COWS UNDER 3½ YEARS AND UNDER 4 YEARS—STANDARD 275 LBS. BUTTER FAT.

Golden Pearl 4th of Wollongbar	Dept. of Agriculture (Denmark)	Guernsey...	863	3	9	12-11-25	273	7,908	5·67	448·77	21	Judge of Wollongbar, 184
Dinah 2nd of Wollongbar ...	do.	do. ...	832	3	10	15-12-25	273	7,464	4·93	368·32	18	Judge of Wollongbar, 184
Noraleda 2nd of Roelands ...	R. H. Rose ...	Jersey ...	14,337	3	7	21-10-25	273	6,987	5·16	361·09	17½	Makarini, 995
Daisy Rye of Grass Vale ...	do.	do. ...	15,688	3	7	28-8-26	273	5,395	6·04	326·19	13½	Rye Duke of Glen Iris, 1994
Cowslip 6th of Darbalara ...	W. G. Burges ...	M.S. ...	13,348	3	11	2-8-26	273	6,877	4·69	322·79	17½	Windsor of Darbalara, 1444
Rye Cream of Grass Vale ..	R. H. Rose ...	Jersey ...	15,701	3	11	18-9-26	273	5,208	6·04	315·08	11	Rye Duke of Glen Iris, 1994
Virginia 18th of Darbalara ...	W. G. Burges ...	M.S. ...	14,857	3	11	6-10-26	273	6,678	4·53	302·65	21	Windsor of Darbalara, 1444
Pretty Polly 2nd of Cowra ...	R. Smith	do. ...	14,414	3	7	15-3-26	273	6,513	4·63	301·63	11	Newhaven of Darbalara, 1174
Minnamurra Holly	Muresk Agricultural College	Guernsey...	953	3	6	6-7-26	273	5,575	4·31	240·33	8½	Minnamurra's Favourite's Prince, 294
Pet of Telyarup	H. O. Timms ...	M.S. ...	N.Y.A.	3	7	5-10-26	60	1,605	4·0	64·14	26½	

COWS OVER 3 YEARS AND UNDER 3½ YEARS—STANDARD 250 LBS. BUTTER FAT.

Koojan Flirt	A. W. Padbury ...	Guernsey...	841	3	3	13-8-26	273	6,133	5·82	356·93	19½	Renown of Koojan, 414
Bonnet 2nd of Berry	R. Smith	M.S. ...	13,168	3	5	23-2-26	273	6,487	5·01	325·08	12½	Newhaven of Darbalara, 1174
Madame 34th of Darbalara ...	W. G. Burges ...	do. ...	14,032	3	5	20-7-26	273	6,199	5·21	324·94	16½	Stockwell of Darbalara, 1850
Rye Cream of Grass Vale ...	R. H. Rose ...	Jersey ...	15,701	3	1	26-11-25	273	5,625	5·61	315·82	15	Rye Duke of Glen Iris, 1994
Rose of Waterside	Wooroloo Sanatorium	M.S. ...	14,533	3	4	29-11-25	273	6,915	4·40	304·32	20	Premier of Mayfield, 511
Primula 2nd of Berry	R. Smith	do. ...	14,434	3	5	12-11-25	180	4,605	4·26	196·41	12½	Rutland of Darbalara, 575
Rye Bread of Grass Vale ...	R. H. Rose ...	Jersey ...	15,700	3	4	10-7-26	180	3,570	4·56	162·96	16½	Rye Duke of Glen Iris, 1994
Ladybird of Grass Vale ...	do.	do. ...	15,695	3	4	15-7-26	150	2,805	5·60	157·14	15½	Rye Duke of Glen Iris, 1994

HEIFERS OVER 2½ YEARS AND UNDER 3 YEARS—STANDARD 225 LBS. BUTTER FAT.

Mokine Empire's Lily 8th ...	T. H. Wilding ...	Jersey ...	N.Y.A.	2	8	2-2-26	273	5,439	7·06	384·20	13	Ettie's Chief of Banyule, 1757
Peree's Rye Capture of Grass Vale	R. H. Rose ...	do. ...	15,699	2	11	25-6-26	273	6,952	5·33	370·74	12½	Rye Duke of Glen Iris, 1994
Mokine Fancy 2nd	T. H. Wilding ...	do. ...	19,131	2	8	28-6-26	273	5,842	5·86	342·43	17½	Ettie's Chief of Banyule, 1757
Myrtle of Cowra	R. Smith	M.S. ...	14,234	2	11	4-11-25	273	6,997	4·64	324·77	22½	Newhaven of Darbalara, 1174
Priscilla 10th of Darbalara ...	W. G. Burges ...	do. ...	14,457	2	11	8-9-26	273	7,165	4·49	321·71	18½	Melbourne of Darbalara, 1142
Lily's Gem of Grass Vale ...	R. H. Rose ...	Jersey ...	15,698	2	9	18-11-25	273	5,742	5·45	312·98	14	Rye Duke of Glen Iris, 1994
Boronia Rye of Grass Vale ...	do.	do. ...	17,529	2	11	18-7-26	273	6,511	4·77	310·82	10½	Rye Duke of Glen Iris, 1994

HERD TESTING—*continued.*

Name of Cow.	Owner.	Breed.	Herd Book No.	Age.		Date of Calving.	No. of Days in Test.	Weight of Milk for Period.	Average Test.	Total Butter Fat.	Weight of Milk Last day of Test.	Sire.
				Yrs.	Mths.							
HEIFERS OVER 2½ YEARS AND UNDER 3 YEARS—STANDARD 225 LBS. BUTTER FAT—*continued.*												
Christmas Cake of Grass Vale...	R. H. Rose ...	Jersey ...	17,530	2	8	27-8-26	273	4,257	6·58	280·32	14	Rye Duke of Glen Iris, 1994
Virginia 20th of Darbalara ...	W. G. Burges ...	M.S. ...	14,858	2	11	6-8-26	240	5,700	4·90	279·33	4	Expert of Darbalara, 1608
Wooroloo Redwing	Wooroloo Sanatorium	do. ...	N.Y.A.	2	7	20-5-26	273	6,084	4·20	255·67	18	Commercial of Blackheath, 2001
Success 2nd of Kelvin Park ...	Hospital for Insane, Claremont	do. ...	N.Y.A.	2	11	29-8-26	273	6,358	3·99	253·71	19½	Daddy Xmas of Croobyar, 928
Cream Duchess of Grass Vale...	R. H. Rose ...	Jersey ...	17,531	2	10	10-7-26	273	4,591	5·50	253·02	7	Rye Duke of Glen Iris, 1994
Mokine Heroine	T. H. Wilding ...	do. ...	19,132	2	10	28-7-26	273	4,723	5·32	51·61	9½	Ettie's Chief of Banyule, 1757
Cherry 5th of Homeleigh ...	Hospital for Insane, Claremont	M.S. ...	N.Y.A.	2	9	28-9-26	273	6,168	4·02	248·15	16	Prince Tasman of Homeleigh, 2238
Treasure 5th of Homeleigh ...	do.	do. ...	N.Y.A.	2	9	7-9-26	273	5,052	3·88	196·03	14	Defender of Homeleigh, 944
Pearl 4th of Homeleigh ...	do.	do. ...	N.Y.A.	2	7	16-9-26	273	4,329	4·07	176·45	8	Prince Tasman of Homeleigh, 2238
Wollongbar Realm 2nd... ...	Muresk Agricultural College	Guernsey...	1,151	2	8	10-7-26	210	3,195	4·87	155·66	4	Bellman of Wollongbar, 334
Golden Cream 3rd of Roclands	R. H. Rose ...	Jersey ...	15,690	2	10	23-4-26	120	1,440	6·64	95·64	9	Brown Fern of Glen Iris, 1364
HEIFERS UNDER 2½ YEARS—STANDARD 200 LBS. BUTTER FAT.												
Wollongbar Bonnie Pearl ...	Dept. of Agriculture (Denmark)	Guernsey...	1,165	2	3	12-9-26	273	6,219	5·56	346·08	23	Bounty of Wollongbar, 336
Koojan Dame	do.	Guernsey...	1,252	2	0	22-6-26	273	7,491	4·48	335·89	22	Robin of Nundorah, 417
Starbrights Lady of Grass Vale	H. R. Rose ...	Jersey ...	17,970	1	10	9-8-26	273	4,680	5·93	277·73	13½	Starbright's Sweet Duke of Glen Iris 3710
Sparkle of Trelawney	Walker & Co. ...	do. ...	N.Y.A.	2	3	12-8-26	273	5,481	4·95	271·42	17	Trelawney
Koojan Lady Beatrice	Dept. of Agriculture (Denmark)	Guernsey...	1,258	2	1	29-6-26	273	5,193	5·19	269·89	16	Robin of Nundorah, 417
Lady Fowler 2nd of Grass Vale	R. H. Rose ...	Jersey ...	17,967	1	11	8-8-26	273	4,266	5·99	255·58	12	Rye Duke of Glen Iris, 1994
Maggie Rye of Grass Vale ...	do.	do. ...	19,113	1	9	22-8-26	273	4,327	5·31	230·05	12½	Rye Duke of Glen Iris, 1994
Sweet Maid of Grass Vale ...	do.	do. ...	19,116	1	5	3-8-26	273	4,110	5·54	227·99	10	Starbright's Sweet Duke of Glen Iris 3710
Wollongbar Dessie 2nd ...	Agricultural College, Muresk	Guernsey...	1,121	2	2	4-7-26	240	4,125	5·36	219·63	9	Renown of Wollongbar, 415
Mokine Columbia Princess 2nd	T. H. Wilding ...	Jersey ...	19,129	2	0	28-8-26	273	3,664	5·58	204·66	11½	Fascinator of Garden Hill, 2754
Koojan Bonnie Princess ...	Dept. of Agriculture (Denmark)	Guernsey...	1,251	2	0	15-5-26	273	3,546	5·71	201·67	7	Golden King of Koojan, 369
Grantana Jacinth	H. G. Walton ...	Red Poll...	1,231A	2	5	11-8-26	273	4,917	3·73	183·39	4	Victoria Werribee, 516A
365 DAYS' TEST.												
Parsons Red Rose 31st of Wollongbar	Dept. of Agriculture (Denmark)	Guernsey...	985	2	8	6-7-25	365	7,547	5·47	411·66	18½	Rose Boy of Wollongbar, 316
Gladness of Wollongbar ...	do. do.	do. ...	452	7	2	28-7-25	365	10,020	5·18	519·64	18	George 3rd, 15

BEET.

J. C. PALMER, Dip.Agric.,
Potato Inspector.

In the summer months salads provide one of the most appetising and beneficial dishes. Beet forms one of the most useful ingredients of such dishes, both from the point of view of flavour and of actual feeding value. The feeding value of the beet is largely derived from the sugar in its sap. In fact, on the Continent of Europe, sugar beet, a modified form of our ordinary beet, is grown very extensively. From the sugar beet is prepared sugar and beet pulp. This pulp, which is the residue left after the extraction of sugar from the sugar beet, contains a fairly high percentage of sugar, and consequently is of great use for the feeding of cattle. From the tops or foliage of the sugar-beet silage is made. At present in Western Australia the sugar beet is not grown, but beets for use as vegetables make a profitable crop. There is one type of the beet, a leafy variety known as "silver beet," which is useful both as a vegetable and as an excellent green feed for poultry.

Soil and Planting.

The commercial seed of the beet as obtained from the seedsman is really the fruit of the plant. Each of the little corky fruits may contain one or more seeds, thus one may obtain two or three beet plants from each "seed." Sometimes the germination of commercial seed is rather disappointing owing to immaturity or even to lack of real seed in the fruit pod. In order to assist germination of the beet seedlings many growers soak their seed for about 24 hours in weak liquid manure solution before planting. This soaking tends to loosen the cork-like skin of the fruit, thus enabling the seedling plants to have a better chance of growing. About 25 lbs. should be sufficient to plant an acre, and 1 oz. of seed will grow about 50 feet of drill.

Beet grows to the best advantage in deep, loose, well-manured soils, more especially those which are as moist and warm as possible. It can withstand extremes of saturation or drought, but the best results are not obtained unless the beet makes steady rapid growth. Beets which are quickly grown are much more succulent and much less woody than those which have received a check in their growth, either by extremes of heat or of saturation. When possible a sunny aspect should be chosen for the seed bed. Most open soils are suitable, but heavy clays—which tend to be cold and wet—should not be planted. Soils in which there is a deficiency of lime will not grow a good beet crop. This crop may be sown most of the year, with the exception of the cold wet weather. In order to obtain a winter crop sow from late in the summer till the middle of autumn, and for a spring or summer crop as soon as the cold of winter has passed. A fresh supply of succulent roots is best maintained by small successive sowings.

The seed, after being soaked for about 24 hours, should be planted in drills about 18 inches apart in rows (extending to 30 inches should horse cultivation be deemed necessary) and about half-inch deep. Should the surface be dry, however, the seed may be planted about one inch deep in order

to ensure sufficient moisture for its germination. Sow the seed thickly, and when the plants have made good headway thin out to about four to five inches between them. Globe or round beets will transplant well, provided that proper care is taken not to injure the roots in the movement of the plants.

Cultivation.

Constant cultivation between the rows will tend to keep down the weeds and will keep the ground in loose condition, which is so essential for the production of good roots. Two deep cultivations at least should be given to the plot before the beets are half grown. Deep cultivations enable the tap-root to go down and develop better, and so the root becomes more shapely and, further, there is less tendency for it to fork. This applies more particularly, of course, to the long type of beet.

The grower should avoid earthing up the beets; if anything, he should endeavour to keep the earth from the roots, for earthing up the roots will cause deterioration, both in colour and in the taste of the beet-roots. Horse hoeing is used in many places, but in the later stages of growth the land between the rows can be hand hoed. A common practice among many growers is to allow the plants to grow thickly till the thinnings are large enough to use for greens. This is false economy, for the beet plants left in the rows never reach the development they would have done if they had been allowed more room for expansion in the earlier stages of their growth. The idea of cultivation is to allow of rapid growth and to conserve the soil moisture as much as possible so that the plants grow steadily and quickly.

Manuring.

Beet, like many of the root crops, are heavy feeders, and consequently respond to heavy manuring. Heavy dressings of stable or farm-yard manure well ploughed in before sowing the seed will yield heavy crops of good beet, the more especially when the crop has been top-dressed with sulphate of ammonia just after it shows in the rows. Nitrate of soda is a useful manure for a top-dressing, though growers are of the opinion that if applied too late in the growth of the crop, it will tend to keep the crop growing for too long a period. The main thing in beet production is early maturity. Most of the soil in Western Australia contains salt amongst its constituents; this is not harmful to the growth of beet, for in its natural environment it is a salt-loving plant; but the application of salt, however, may tend to make the beet rather coarse and less palatable.

Unfortunately, stable manure is not obtainable very readily in many parts of Western Australia, so artificial manures must be used. The main requirement of the beet crop is plenty of phosphoric acid and potash.

The potash tends to improve the sugar formation in the root. This sugar formation is, of course, the main reason for growing the crop. A very useful manure is 1 cwt. sulphate of ammonia, 1 cwt. sulphate of potash, 3 cwt. superphosphate, applied at the rate of 5 cwt. per acre. With this manure 50 per cent. of the sulphate of ammonia should be applied in the furrow with the potash and the superphosphate, the remaining 50 per cent. being applied when the crop is about half grown.

Harvesting.

The roots are ripe when the leaves begin to yellow. Great care must be taken that the root is not injured when it is being dug. When the crops are being dug for market the tops should be left intact: in fact every care must be taken that there is not loss of cell sap. This cell sap contains a high percentage of sugar, and consequently any loss—or bleeding, as it is termed—affects the sugar content of the beet. Bleeding also causes the beet to bleach or discolour, and consequently it is less attractive from the consumers' point of view.

Varieties.

There are numerous varieties of red beets for sale, and it is a matter of local experience which are the best to grow. There are the two types in general use, the Globe and the Long. The globe type is more generally grown because the long type is rather slower in maturing; the former will be found ready for use in 50 to 60 days, whilst the latter takes the whole season to mature.

Globe varieties suggested are the Egyptian and the Crimson Globe, long varieties the Long Blood-Red and Crimson Perfection.

Silver Beet.

This is a variety of beet root, the leaves of which have been developed for culinary purposes. It makes an excellent green feed for poultry, besides a vegetable which can be used like spinach. It is grown in a manner similar to that of ordinary beet, but the plants should be placed at a distance of not less than 15 inches apart. Silver beet responds to moderate dressings of liquid manure, which should be commenced at about half growth and applied in light quantities every two or three weeks. It is gathered by removing the outside leaves, fresh growth continuing to be made from the centre of the plant. The dark green varieties are the best to sow.

POTATO CHIPS.

G. N. Lowe,
Senior Potato Inspector.

Fumigation of Seed or Other Potatoes.

Most potato growers are well aware of the losses occasioned through the ravages of Potato Moth, particularly in seed which it is desired to hold during the early summer months, prior to planting again.

Fumigation with carbon bisulphide at the rate of 2 lbs. of the chemical to 1,000 cubic feet of air space is the best known and most effective means of eradicating the larvæ of the moth in infected tubers.

Unfortunately, up to this, the question of expense entailed in the construction of an air-tight chamber specially built for the purpose has had the effect of limiting this method of treating seed by growers to the minimum, although probably each season the loss in seed represents the cost of a fumigating room to most growers of any area of potatoes in districts where the moth is worst.

This Branch is much indebted to Mr. W. L. Nelson, of Bridgetown, for a description of an ingenious and simple method of providing a chamber at a very low outlay.

Mr. Nelson who, amongst his other activities, grew potatoes whilst at Kendenup, experienced trouble with the Potato Moth in his seed, and set about overcoming it, and did so in a way which will appeal to every potato grower similarly placed.

To quote Mr. Nelson's own words:—"I found that the moth and larvæ could not stand up to the carbon bisulphide fumigation carried out as advised by the Department, but the trouble and cost of making a good gas-tight room was one which I had to tackle from a different angle."

I obtained a second-hand (goldfields) corrugated iron tank, which cost about 35s. delivered. It leaked badly in places, but the leaks were easily found with water and together with the tap hole were closed with putty.

The size of the tank was about 600 gallons—tall three-sheet style. The top was removed and the tank inverted, and a strand of wire run round the bottom (now the top) corrugation and looped across to permit of suspension from a yard-arm attached to an old dead tree, which was handy, although a mast could quite easily be erected for the purpose.

The yard-arm had a pulley block attached through which a rope was run and fastened to the wire loop on the tank to allow of its being raised and lowered.

A post a trifle less than the height of the tank was then placed in the ground to serve as a "core." Round this four bags of potatoes on end were placed and tied, and a second four bags were rested on top of these and lashed, making half a ton at one time for fumigation. The tank was, of course, raised meanwhile.

I was rather liberal with the carbon bisulphide, using two fluid ounces each time "just to make sure." This was placed in a sardine tin on top of the post, and the tank lowered into place over the stack and a good bank of soft earth or sand heaped round the contact edge to prevent leakage of the chemical.

I tested it in various ways for leakage, and found it held well; moreover potatoes treated in this manner at an interval of a week were thoroughly clean, and in the case of seed strong healthy shoots quickly formed.

Just here the writer would strongly advise that testing for leaks with a match be *not* tried. Any leaks will surely be so found, but the results will be distinctly alarming at least, as carbon bisulphide is an explosive agent when combined with air, and naked lights must be kept well away when it is being handled.

The period of fumigation is 48 hours, and as a single fumigation does not always destroy the eggs a second treatment should follow six or eight days later.

If the second fumigation is longer delayed the young larvæ which survived the first may quite easily cause damage to the "eyes" and buds, which places are selected chiefly for ingress to the tuber.

A third treatment may quite safely be given without serious injury to the buds or the eating qualities of the tuber itself.

View of portion of potato crop grown at Augusta by Mr. Elliss.

Potato Growing at Augusta.

The illustrations (Nos. 1 and 2) show crops in the course of growth on the property of Mr. William Elliss, of Augusta, and are of interest in that they depict the first area of more than a quarter of an acre grown by a private individual in this area.

The crop averaged eight tons per acre, and was grown in land similar in the main to that of a large area in the locality.

Mr. Elliss has cleared and ploughed 40 acres, which will be largely devoted to potatoes, and is a firm believer in the virtues of fallow for potatoes.

Another portion of Mr. Elliss' crop grown at Augusta.

The Effects of Lack of Grading.

A repetition of what has taken place from the time of digging the South-Western summer crop and onwards, through lack of care in the matter of grading of tubers, has been even more evident this season.

Merchants are sold trucks from the country, probably through a storekeeper who describes them as prime lines, relying solely on what certain careless growers in their turn describe them to him. The consignment duly arrives, and is found to contain potatoes of every imaginable size bagged up together.

The merchant, because of the uproar emanating from the housekeeper who strenuously objects to trying to peel a big percentage of "marbles" included in her stone of potatoes, finally becomes so heartily tired of such complaints that in desperation he decides to order importeds, which do not show this fault.

The spectacle is then afforded of big shipments of imported potatoes coming into the State, whilst hundreds of tons of locals are sluggish of sale, actually because of the delinquency of a percentage of growers who are not sufficiently alive to their own interests to properly grade their produce.

It is, of course, recognised that the trouble arises with the contract digger whose sole aim is to fill the bag at the maximum speed, and it is quite impossible to supervise properly the work of these men, particularly when the owner of the crop is on tenterhooks lest his potatoes shall be flooded.

As the first care is generally to remove the filled bags to a place of safety when grown in swamp areas, the solution appears to be that the crop

shall be bagged as one sample and that grading be done afterwards, either by the grower himself or at a central grading shed where a machine is installed.

It is very certain that buyers will not pay top prices for any class of produce of which they are doubtful as to grade or quality.

Width of Planting.

Relative to the foregoing the spacing of the planting distances has a very distinct bearing, particularly in the summer crop in Benger Swamp, where generally the system is undoubtedly too close for the proper development of tubers of the size most desired by the thrifty cook. This important person in the household *regimé* is, after all, the arbiter when it comes to culinary requirements, whether it be potatoes or partridges.

The average width of planting between rows is 20 inches (two ten-inch furrows) and about 15 inches between "sets," in Benger Swamp.

Actually these distances are considerably less than the same growers follow in the winter planting when moisture is not the limiting factor, as is very often the case in summer.

With an ideal season these measurements are probably near the mark, but as ideal seasons do not occur with that regularity that farmers desire, surely, from a standpoint of caution alone, it is wise to make the necessary allowance in adequate room and added moisture per plant.

Certainly a crop planted 30 inches between rows and 18 inches between "sets," in the summer, has a far greater chance of properly developing than at the above congested distances when no rain falls in probably two-thirds of the growing period.

Over-wide planting, of course, whilst making for some economy in material, generally reduces the yield too much proportionately to be profitable, but the spacing, general in Benger, necessitates the use of about 15 bags of "round" seed per acre, which is surely an item.

No similar allowance is made for extra manure, to the consequent restriction of the crop in this direction again.

The size of the resultant tuber is very definitely increased also by the use of "cut" seed from large tubers, as most growers in Benger have found long since, and with the "wet-bag" treatment of such cut seed proved as safe and beneficial, the use of this is advised to help eliminate the quantities of small stuff that are becoming increasingly difficult (and rightly so) to dispose of.

The Certified Seed Scheme.

It is most pleasing to be able to chronicle a very decided increase in the applications under the scheme both from Denmark-Young's Siding area and Benger Swamp. The tonnage passed and sealed as against last season has increased ten times, although not all the crops for which applications were submitted were eventually certified to, as was natural.

Those growers who were fortunate enough to have their seed finally passed are delighted with their sales at considerable advances over ordinary rates, and the demand for this class of seed has been quite remarkable.

Of greater importance is the fact that the buyers of it are most satisfied with the way the seed opened up, and those who planted early report most encouragingly on the appearance of their crops.

Just here it may be well to suggest to those growers who intend buying next season the "earliest" or most forward certificated seed, which comes from the Denmark line, the wisdom of not being in too great a hurry to plant, just because the seed happens to be sprouting. This very fact allows of such seed being "greened" and planted a month later than unsprouted seed which takes six weeks or longer to show up, and still have the crop out before that from "late" seed, with the consequent avoidance of the bad weather conditions, particularly with reference to heavy winds at the critical stages of the growth.

Instances are to hand at the time of writing where crops from early certified seed planted in mid-June have been "blown to ribbons" by the winds so usual at this period, which, prior to this happening, looked promising enough to provide "the car."

One very decided effect of the popularity of certified seed is interesting, this being the quantity of "round seed' which remains unsold even at very cheap rates. Incidentally, this is an added reason for the growing of larger tubers in Benger Swamp, and points to the fact that the idea that the smaller the potato the better it is for seed is at last being recognised by the grower of limited experience as being fallacious.

Because of the popularity of certified seed certain unscrupulous people, not possessed of any themselves, have made sales of potatoes represented as being such.

For the protection of possible buyers in future it is pointed out that all certified seed is in new bags bearing the name and address of the grower in two-inch stencil, double-sewn, and bearing the cloth certificate on the mouth, the ends of the twine attaching being closed with a leaden seal bearing the initials "D.A." and "W.A." on either side.

An illustration of the front and back of the certificate is given herewith:—

[FRONT.]

DEPARTMENT OF AGRICULTURE.

CERTIFIED SEED POTATOES.

Variety..... **First Grade.**

Grower's Name.....

Address .....

Inspected by..... **Date**.....

[BACK.]

WHAT THE CERTIFICATE MEANS.

1. **That at the time of inspection the tubers in the bag were, to the best of the Inspector's knowledge, free from disease or moth infection.**
2. **That the variety is true to name.**
3. **That the tubers are from a crop desirable for seed purposes and from a heavy yielding crop.**

NOTE.—This Certificate is void once the seals on the bag are broken or the bag itself cut or burst.

These particulars it is hoped will prevent prospective buyers from being caught.

The Cutting of Seed.

Numerous inquiries, more generally from new arrivals, as to the method of seed-cutting have recently been received, and illustration No. 5 readily conveys how "sets" should be cut.

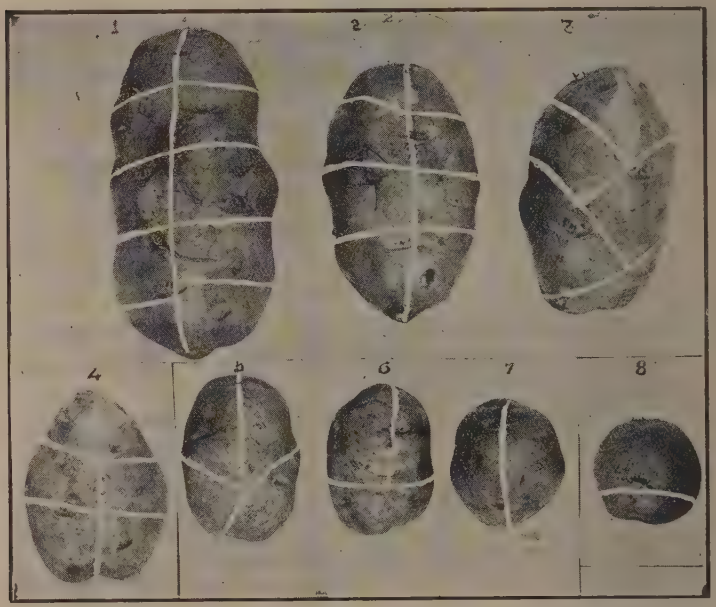
The weight of "sets" should be of an average of about two ounces and "blocky," rather than thin and narrow.

With the Delaware of proper grade—and those as small as Nos. 7 and 8 in the illustration are below first grade, and are best discarded as seed—the eyes are very evenly distributed in the form of spirals from "crown" to "heel," and the searching for the "eye," one of which must be included in each "set" is therefore simplified, and this tends to shorten the time taken in cutting.

For the purpose a very old thin-bladed table knife, given an occasional rub up on the oil stone, is most effective. Heavy-bladed knives, besides being found awkward and clumsy, cause splitting rather than a clean cut, and this should be avoided.

A considerable saving of time is effected where a large quantity of seed is to be cut if the knife is stuck upright, point down of course, in a deal board on which the operator is seated and the tuber pushed against the knife, allowing the cut portion to fall into a bag conveniently suspended in front. A sloping table placed handy and arranged so as to have the seed continually rolling within reach of the cutter will also save time.

Should tubers as small as No. 8 be included, the "heel" should be sliced off to keep germination even with "sets" cut from larger ones, as cutting induces a tendency to quicker reproduction.



Method of cutting tubers for seed. It is advisable to avoid seed such as No. 8, but if used, the bottom portion or "heel" should be discarded.

The "Delaware" in Tasmania.

A small parcel of "Delaware" weighing 6 lbs. only, sent by Mr. A. E. Martin, of Young's Siding, to Mr. A. F. Raffelt, of Deloraine, Tasmania, last season, has given a splendid return.

This seed came from a portion of Mr. Martin's crop, which yielded at the rate of 20 tons per acre, and in a recent letter to this Branch Mr. Raffelt gave particulars of the yield obtained.

The tubers were planted on 18th October and dug on 18th March for a return of 300 lbs., or at the rate of 50 to 1.

The only fertiliser used was a few handsful of superphosphate, which speaks well, not only for the soil planted but also for the high yielding characteristics of the "Delaware," which is the main cropper in this State.

Planting and Planting Bags.

For use where planting by hand, and this is still almost solely practised, the type of planting bag or "koota" shown in illustrations Nos. 6 and 7 are commended to growers.

The material used is stout canvas, and the "braces" of webbing with short straps and buckles at each end for adjustment.

Front view of double planting bag or "Koota" in use.

The bags are constructed wider and deeper in the front to allow of the seed collecting there, as the planter uses the supply in the stooping position. To stiffen the bags a piece of white wood the requisite length and depth for the measurement of each bag is placed between the canvas of the inside "wall" of the bag, and another similar piece which actually in use rests on the operator's thigh and these sewn to enclose the board.

This method makes a more permanent job than tacking or nailing the board to the canvas "wall."

The advantage of this type of "koota" over the usual one made from a cut up cornsack hung round the neck is that more than double the weight of seed can easily be carried as the load is properly distributed, and the knees of the worker are left quite unimpeded.

Double planting bags viewed from the back, showing arrangement of braces.

I expect to pass through this world but once. Any good, therefore, that I can do, or any kindness that I can show to any fellow creature, let me do it now. Let me not defer or neglect it, for I shall not pass this way again.—*T. Carlyle.*

SEED POTATOES.

PEDIGREE DELAWARE SEED POTATOES

rown under the inspection of the Department of Agriculture, in iew bags, sealed and certified by the Department's Inspectors.

ROUND AND LARGE DELAWARE SEED

nspected and dipped in Fungicide solution, under the direction of the Department of Agriculture.

Prices and particulars obtainable from the Seed Department,

THE WESTRALIAN FARMERS, LIMITED,
WELLINGTON STREET, PERTH.

2—4

"PINK EYE," OR OPHTHALMIA IN SHEEP.

F. Murray-Jones, B.V.Sc., M.R.C.V.S.,
Chief Veterinary Officer.

This is an infectious disease found in many districts in Western Australia, due to a specific germ which has not yet been identified. This germ is carried from infected to healthy sheep's eyes by means of flies, etc. The resulting disease affects the eye after a few days, and causes conjunctivitis, *i.e.*, inflammation of the conjunctiva, followed by opacity of the cornea, and sometimes ulceration of the cornea.

Symptoms.—Affected sheep have at first a dread of light and hold their heads low and eyelids partially closed, and have a slight discharge of tears from the eye. On catching the sheep and examining the eye at this stage it will be found to be free from foreign bodies, grass seeds, etc., and appear to be normal except for perhaps a slight increased redness of the eyelids. The eyes gradually become worse and conjunctivitis becomes more marked, giving the eye a faintly pink appearance. After a time, depending on the severity of the infection, the cornea or glassy-looking portion of the front of the eye becomes cloudy, later it becomes milky, and finally opaque or dense white colour. By this time the sheep will have lost condition and be

unable to look after themselves, and may be injured by running into obstacles, or may be drowned. This disease gradually spreads to all sheep in close contact, and is a very serious matter, especially if ewes are near lambing.

If proper treatment is provided the sheep will gradually recover their eyesight, and spread of the disease to other sheep will be prevented. In this connection it might be as well to remind sheep-owners that it is an offence under the Stock Diseases Act to sell sheep affected with any infectious disease. The only way to avoid "Pink Eye" is to—

(1) refuse to purchase sheep from known infected flocks;

(2) examine fresh purchases and isolate them for a week, or until satisfied that they are free from disease. This is a wise procedure with all fresh purchases of livestock. If the flock is already infected remove the infected sheep into a well-shaded homestead paddock, and hand-feed and water to prevent the serious loss of condition, which will otherwise occur. The eyes of these sheep should be treated daily with the following lotion:—

Sulphate of zinc—10 grains.

Extract Belladonna—10 grains.

Water which has been boiled and allowed to cool—1 pint.

All discharges from the eyes should be removed with cotton wool, before using the eye lotion. The lotion must not be made up overstrength, or permanent damage may be caused to the eye. If unable to get the lotion made up the following lotion may be used instead:—Boracic acid, one teaspoonful, dissolve in a little hot water in a cup. Get a clean beer bottle which has previously been rinsed out with hot water, and fill to neck with warm water which has been previously boiled, then add boracic acid solution. Shake before using. Sheep which are showing an opacity or whiteness of the cornea may be treated with the following lotion:—

Silver nitrate—1 drachm.

Water which has been boiled—1 pint.

A camel hair brush or a fountain pen filler is useful to apply the lotion with, or a clean new oil can.

Valuable stud animals may be treated with yellow oxide of mercury ointment, which is sold in tubes. Every morning early the healthy sheep should be inspected to pick out the fresh cases, and these should be removed to the isolation paddock. As the sheep recover they should be put out into another paddock, and not allowed to mix with the healthy sheep until all danger of infection has ceased. The sheep usually recover their sight fully and the infection will disappear in time, but the loss of condition is nearly always severe, and the amount of extra work involved in handling the flock or moving them about is often enormous.

An experiment carried out recently at the Veterinary Laboratory proved that this disease is infectious. Work is also being carried out to find out the causal organism, and if possible, to produce a vaccine which will prevent infection.

LUCERNE FLEA.

(*Sminthuris viridus.*)

L. J. NEWMAN, F.E.S.,
Entomologist.

Lucerne Flea constitutes one of the most serious of our insect problems.

The attack by this pest is confined to the wet season, namely mid-May to October. On the advent of the first rains in May, the young fleas make their appearance, the pest dying out as soon as the dry warm weather comes in, which is usually late October.

The flea is somewhat of a cosmopolitan plant feeder, but is especially keen on lucerne, peas and clovers. Cape Weed and other succulent plants afford food if clovers or legumes are not present. It is on clovers that much of the success of our South-West pastures depends. Unfortunately the flea concentrates its feeding energies on these plants. Clovers are annuals, much of the seed responding to the first general soaking autumn rains. These young plants reach the stage of the Cotyledon, or first pair of leaves, when the flea makes its appearance. The seedlings are attacked and riddled with small irregular holes. When badly infested only the veins of the leaves remain, the plants being depleted of green parts and have the appearance of being bleached. When the flea is numerous many animals will refuse to feed over infested areas. In any case, should the plants survive the attack, the early feed, for which the clovers are looked to to supply is stunted, and contains little food value. Later on in the spring when conditions of soil and temperature are drier and warmer, the clovers will outgrow the flea and finally yield a crop. The loss of this early feed is a particularly serious drawback to dairying.

The problem with which we are faced is not so much what will kill the flea, but how can we economically and successfully deal with such a widespread and active pest of our pastures. When an insect infests a specific crop, which is grown in a given limited area, there is every possibility of its control by artificial measures. In the case of the flea we have an insect that has assumed the role of a general and widespread pest, with numerous species of food host plants. To control an insect of this nature artificially is rendered very difficult and from an economic point of view, impossible. Under such circumstances the fight to control is a continuous one, as the treated areas are re-invaded from the contiguous infested areas. Being a powerful hopper, the flea can spread rapidly from an adjacent dirty area to a clean one. The fact that the flea floats on water renders it easy of transport from place to place.

Prevention and Treatment.—As before stated, the flea appears after the first autumn rains. Ten days after it has made its first appearance is the most successful time to tackle it. If prompt action is taken then with approved ways and means, a great blow can be successfully dealt the hopper before the egg-laying stage is again reached. By killing off this first brood

egg deposition would be prevented. Unfortunately the line of least resistance makes a strong appeal to most people, and consequently any proposed action is postponed to a future date.

About the middle of July the ravages of the flea are becoming very apparent, and a hue and cry is made as to what can be done to stay the plague. By this time it has multiplied and spread over large areas, and in most instances has got beyond artificial control.

Prevention.—First and foremost is clean, weed-free fallow. The land to be cropped the following winter should be turned under in the spring, and all weeds well buried. It should be worked several times, and kept free of all plant growth up to the time of sowing. This will guarantee that the crop of clovers at least will be free of the flea when the seed germinates. The young seedlings will then have a chance to establish themselves before the flea migrates into the crop from the surrounding infested areas. A useful method of checking this migration is to surround the crop with a strip of clean fallow 35ft. to 40ft. wide. This strip should be kept well worked, thus maintaining a loose mulch over which the flea will not readily travel. A good dressing of lime may be given this strip.

All headlands and fence alignments must be kept free of rank weed growths and rubbish.

Dirty farming methods are conducive to insect troubles.

Knowing that the flea is conveyed per medium of running water, it is advisable to divert all surface water from the field to be protected.

Burning over the infested paddocks with a quick fire has proved very effective. This does not destroy the clover seeds, but gets rid of many weed seeds and frees the land of flea and mite.

Treatment.—Prompt measures must be taken on first appearance of pest.

Many experiments have been made with various specifics with just as various results.

Over limited areas and in gardens the pest can be successfully treated by using any of the following mixtures:—

(1) Black Leaf 40—1 pint. 40 per cent. nicotine sulph.
Sunlight Soap—4 lbs.
Water—80 gallons.

Shred the soap and dissolve by boiling. Add to the Black Leaf 40 and water, mixing thoroughly. Apply cold with spray pump.

(2) Sunlight Soap—8 ounces.
Turpentine—8 tablespoons.
Water—4 gallons.

Dissolve soap, remove from fire and add turps, stirring well. Bring up to 4 gallons by the addition of hot water. Apply hot.

(3) Arsenate of Lead—3 lbs.
Water—40 gallons.
Spray over infested area.

Note.—Being a poison, all vegetables and foliage so treated within three weeks of cutting *must be well washed* before being consumed.

Stock must not be pastured over an area so treated within a period of three weeks.

If fodder is being cut, such as lucerne, it is advisable to spray after making the cut.

(4) Dusting powder, as used against the mite, is effective—
1 lb. 15 per cent. carbolic powder to 4 lbs. of super., Thomas phosphate, lime or other diluent.

This is broadcasted over the infested area by means of a super. spreader or other suitable medium. Only mix sufficient for immediate use.

(5) Another mixture used with good effect is naphthalene, at the rate of 1lb. of crushed or flaked naphthalene to 3lbs. of lime or other diluent. Naphthalene is insoluble in water, and therefore cannot injure plants if used without diluent. It gives off a gas which is deadly to the flea.

(6) A mechanical method of destroying the flea is by means of tarred screens or shallow trays. The draft or pulling of these screens must be to one side, in the same manner as a harvesting machine. This is necessary so that the fleas will not be disturbed by the horses and hop out of the range of the screen. When disturbed by the tarred screen or tray, they rise in the air and are blown on to the tarred surface and held captive. These screens are drawn up and down infested fields, and are the means of effectually capturing millions of the fleas.

Biological Control.—It is realised that when a pest becomes widespread over vast areas of country, its control by artificial methods is not economically possible. Our hope lies in the discovering of some natural parasite. With this end in view communications have been forwarded to leading entomologists in various countries, inquiring as to the presence and status of the Lucerne Flea, and whether any natural enemies are known to exist. If same are known to be effective every effort will be made to introduce and establish them. It may even be necessary to replace clovers by other fodder plants not relished by this pest.

If you are going to do a good thing, do it now; if a mean thing, wait till to-morrow.

No good thing is a failure and no evil thing a success.

SUDAN GRASS.

In our June issue we published a paragraph relative to the results noted by Mr. George C. Hodges, of Popanyinning, in reference to mixing superphosphates with Sudan Grass seed and the fact that no injurious effects took place, although the mixture was not sown until some little time later.

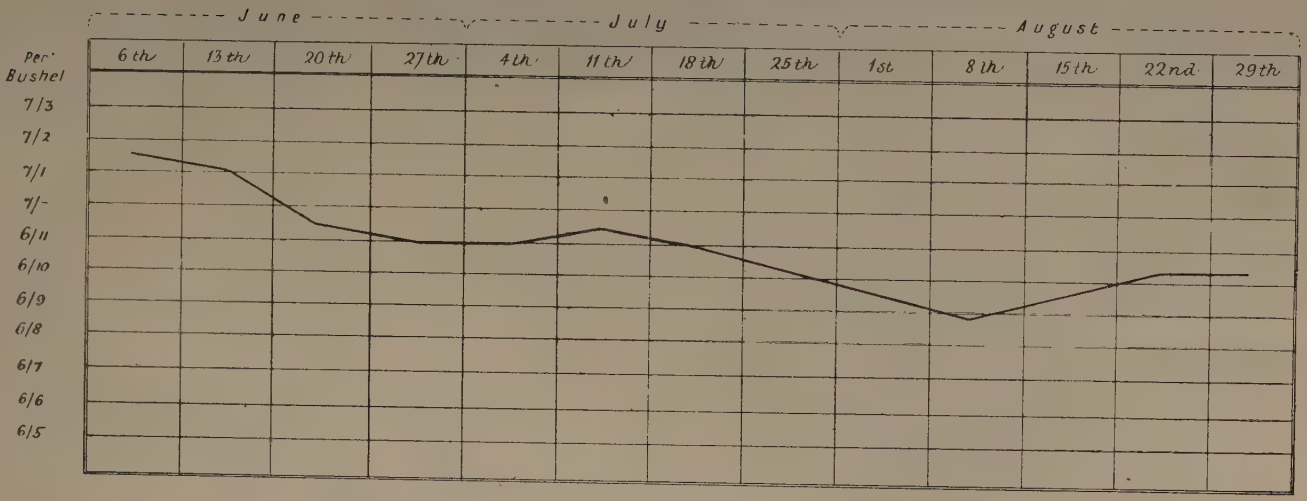
Mr. J. M. Riegert, who has had much experience, now writes from Yarloop, as follows:—

". . . . . As I have had some little experience as a Sudan Grass grower, would you kindly permit me to give my view. I always mix seed and super. together to drill it, and I find that when using super. fresh from the works it is extremely unwise to leave it in contact with the seed for more than two days before sowing, and have even known 24 hours to make a noticeable difference in the germination. To guard against this I often use a mixture of one part of bonedust or ground phosphate to three or four parts of super., the admixture having a tendency to absorb or counteract the free acid in the super., and also absorbs much of the moisture which is present in fresh super. A little lime added to the super. is also very beneficial. Naturally, those seeds which are dehulled are the first to suffer, whilst those having their protective shells intact are not in direct contact with the acid, which has to penetrate the shell before it can reach the seed itself and injure it. It will be noticed that the action of the acid causes a reddening of the shells, and when this is very pronounced it is wise to add a little fresh seed before sowing.

"On the other hand, if old dry super. is used the seed can be mixed with it and left for twelve months and still give a fair germination; provided that the super. is at no time permitted to become moist. Probably this applied in Mr. Hodges' case.

"I agree with Mr. Hodges when he says that Sudan Grass should not be sown too early. It will not thrive on cold, wet or sour soils. At the same time it is always wise to thoroughly prepare the land well beforehand, because the better the condition of the soil the better the crop will be; and if a quantity of fertiliser can be ploughed in so as to induce the roots to go down to the moisture, it will greatly benefit the crop. If no 'T' bar roller is available the land should be well harrowed immediately after sowing. Unlike Japanese Millet, Sudan Grass can always be followed by a good winter crop of wheat or oats."

Return of Wheat Prices Per Bushel C. I. F. & E. London.



Compiled from figures kindly supplied by the Co-Operative Wheat Pool of Western Australia

MARKET REPORT.

The following particulars of the approximate quantity of chaff available for auction at the metropolitan chaff and grain sales, held in Perth during the months of June, July, and August, also the minimum and maximum prices ruling for f.a.q. to prime quality wheaten, have been supplied by Messrs. H. J. Wigmore & Co., Ltd., of Wellington Street, Perth.

June—Quantity, 1,445 tons.
Maximum price, £8 10s. per ton.
Minimum price, £7 15s. per ton.

July—Quantity, 1,645 tons.
Maximum price, £8 5s. per ton.
Minimum price, £7 10s. per ton.

August—Quantity, 2,200 tons.
Maximum price, £7 15s. per ton.
Minimum price, £6 15s. per ton.

It will be noticed that since the maximum price of £8 10s. was secured in June supplies gradually became more plentiful, and that in August the heaviest supplies were available. This, of course, had the effect of weakening the market, and at the time of writing consignments are still coming forward freely, the following being closing quotations:—

Prime—£6 15s. to £7 per ton.
F.a.q. to prime—£6 5s. to £6 10s. per ton.
F.a.q.—£5 15s. to £6 per ton.
Good mediums—£5 5s. to £5 10s. per ton.
Mediums—£4 15s. to £5 per ton.

Present prices, of course, are not as high as those ruling some few weeks ago, but nevertheless, they cannot be called unsatisfactory, and as new season's will be soon available, we would advise farmers having a surplus to consign to auction.

Oaten Chaff.—The market in sympathy with wheat is easier, f.a.q. being worth £6 per ton; good mediums, £5 10s. to £5 15s.

Oats.—The market throughout the period under review has been steady, up to 4s. per bushel being secured for good heavy feed samples; at time of going to press this quality being worth 3s. 9d. to 3s. 10d.; mediums 3s. 5d. to 3s. 6d.

Wheat.—Up to a few days ago f.a.q. was selling at 5s. 7d. per bushel, but the market is now easier at from 5s. 5d. to 5s. 6d.; smutty and inferior at lower rates, according to sample.

METEOROLOGICAL INFORMATION.

STATIONS.	TEMPERATURE.				RAINFALL.		TEMPERATURE.				RAINFALL.		TEMPERATURE.				RAINFALL.	
	Maximum.		Minimum.		For Month.	Average.	Maximum.		Minimum.		For Month.	Average.	Maximum.		Minimum.		For Month.	Average.
	Mean.	Highest.	Mean.	Lowest.			Mean.	Highest.	Mean.	Lowest.			Mean.	Highest.	Mean.	Lowest.		
	JUNE.						JULY.						AUGUST.					
					inches.	inches.					inches.	inches.					inches.	inches.
Chapman Farm State	64·8	71·2	45·2	41·5	5·32	4·09	63·7	70·2	45·3	38·0	3·90	3·97	65·8	73·4	45·7	38·1	2·77	2·72
Geraldton	68·1	72·0	52·6	45·2	3·58	4·73	66·5	74·5	52·7	43·0	4·17	3·90	68·7	73·0	52·4	42·8	2·08	2·94
Walebing	62·0	68·8	43·1	36·0	3·61	3·95	60·1	67·0	41·2	32·4	4·34	3·68	62·9	74·0	42·5	32·8	2·23	3·05
Perth	63·6	70·8	48·5	41·0	7·98	6·92	62·2	67·1	47·6	38·1	6·23	6·57	63·8	70·0	49·6	38·0	6·49	5·63
Kalamunda	64·3	68·9	47·1	40·2	8·82	8·01	64·0	70·0	47·0	39·0	7·86	8·06	64·8	68·0	49·5	43·0	7·38	6·71
Bunbury	61·6	71·2	48·0	38·8	7·48	7·16	61·6	65·2	47·0	37·4	6·46	7·00	62·4	65·8	49·4	37·2	3·13	5·43
Bridgetown	59·3	68·0	39·8	30·5	6·37	6·81	59·3	64·0	39·2	26·0	3·93	5·84	61·4	70·5	40·6	29·9	5·08	5·06
Albany	60·1	68·6	46·4	37·0	6·54	5·46	58·8	65·4	46·4	37·0	5·93	5·50	61·9	68·0	46·8	37·0	4·66	5·21
Merredin State Farm	59·7	67·2	43·3	32·2	1·64	1·84	58·7	65·8	41·5	28·0	1·32	1·96	62·2	73·2	42·5	31·0	·89	1·42
Northam	61·9	68·2	41·1	33·0	3·25	3·29	62·3	70·0	41·1	31·0	3·15	3·39	63·7	72·0	43·8	33·5	2·20	2·58
York	62·7	71·0	42·1	33·0	3·63	3·35	60·6	68·0	41·8	29·0	2·68	3·35	63·6	71·0	42·8	32·0	1·66	2·84
Narrogin State Farm	57·9	64·9	41·6	33·7	3·75	3·61	57·5	63·2	40·9	31·1	2·94	4·14	59·8	67·0	41·4	31·9	2·91	3·18
Katanning	57·9	65·2	42·2	33·0	3·78	2·85	57·2	62·0	52·2	30·0	2·34	3·07	59·5	68·0	42·2	32·2	2·20	2·50
Cape Leeuwin ...	61·0	67·0	52·5	47·0	8·28	6·83	59·9	66·0	51·4	43·0	6·64	7·18	61·0	66·0	52·4	46·0	5·75	5·21

LIVE STOCK AND MEAT.

For the information of readers of the "Journal," the following particulars have been supplied by Messrs. Elder, Smith, & Co., Limited, Perth:—

COMPARATIVE YARDINGS OF STOCK AT METROPOLITAN FAT STOCK MARKETS DURING MONTHS OF JUNE, JULY AND AUGUST, 1927.

	JUNE.					JULY.				AUGUST.				
	1.	8.	15.	22.	29.	6.	13.	20.	27.	3.	10.	17.	24.	31.
Sheep and lambs	10,363	9,373	9,144	9,521	6,513	8,051	10,456	10,548	10,824	9,023	10,096	9,504	9,427	11,093
Cattle ...	690	580	746	801	601	600	711	702	776	764	710	678	731	595
Pigs ...	711	682	752	894	529	749	685	684	1,122	887	759	736	984	640

COMPARATIVE VALUES PER LB. OF STOCK SOLD AT METROPOLITAN FAT STOCK MARKETS DURING MONTHS OF JUNE, JULY AND AUGUST, 1927.

	JUNE.					JULY.				AUGUST.				
	1.	8.	15.	22.	29.	6.	13.	20.	27.	3.	10.	17.	24.	31
Mutton ...	8	7½	7½	7	7½	8	8	7½	7½	7½	7½	7½	8½	8½
Beef ...	6½	6½	7	7	6½	6½	6½	6½	6½	6	5½	5½	5	5
Pork ...	11	11	11	11	11½	11½	11½	11½	11½	11½	11½	11½	11½	11½
Bacon ...	9	9	9	9	9	9	9	9	9½	9½	9½	9½	9½	9½

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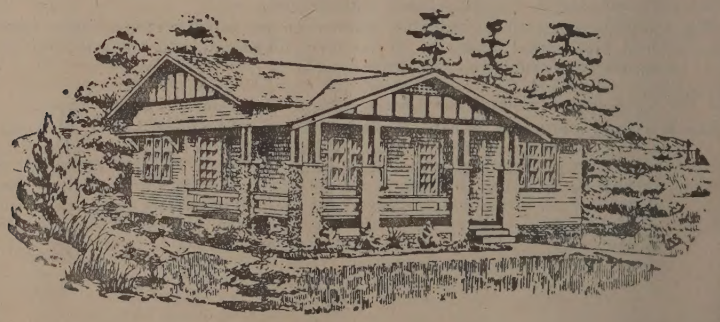

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3—4